

# SD Times

SOFTWARE DEVELOPMENT

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## iANYWHERE AS WIRELESS ASP: 'SOUP TO NUTS' FOR MOBILE DEVICES

Database developer extends to hosting services, completes last mile of end-to-end solution

BY EDWARD J. CORREIA

If you want something done right, you have to do it yourself.

That's why Sybase subsidiary iAnywhere Solutions Inc. says it's launched a wireless application hosting service. The mobile-database-developer-turned-ASP is targeting its new service at OEMs and enterprise developers promising full-time access to enterprise data systems, and citing existing gateway providers as unsuitable for the job.

Rob Veitch, iAnywhere's director of business develop-



Existing ASPs were unsuitable for our purposes, says iAnywhere's Veitch.

ment, said that much of the difficulty developers face when building wireless networks is with connecting their enterprise data to the wireless carrier. "As we rolled this thing out, we found that there's a pretty big barrier at the hardware infrastructure layer," he said. "Because in order to build a wireless solution, you need to figure out how to get from the carrier to your application server."

These types of connections commonly use frame relay or

► continued on page 18

## A Clear Case for Good Management

Rational's suite upgrade emphasizes better oversight, quality

BY DAVID RUBINSTEIN

Five software versions in 22 months. Get ready for Rational Software Corp.'s Rational Suite version 2001, an upgrade of its family of development tools that the company said delivers new strategic initiatives for change management, quality assurance and project management.

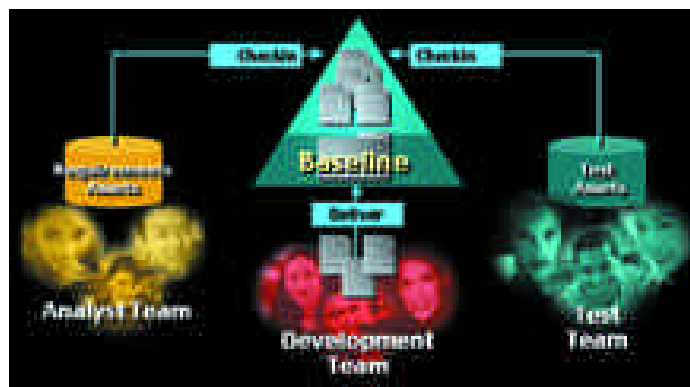
This marks the fifth release of the suite, which comprises 18 Rational products for software developers and managers. According to Bill Taylor, Rational's director of product marketing, among the highlights of this update is the inclusion

of the ClearCase LT configuration management tool and Test Manager testing tool within the company's four Studio products as part of Rational's Unified Change Management (UCM) initiative, which embraces the concept of managing change across the life cycle from design to deployment.

Small shops can reap the benefits of ClearCase LT, then move

into the more full-featured ClearCase and ClearCase Multi-Site versions as they grow, "without retraining or retooling and with total integration," Taylor said. The inclusion of ClearCase LT and Test Manager in the Analyst Studio and Test Studio products provides benefits of change management not just for code and models, he explained,

► continued on page 14



The UCM initiative fosters change management from development through deployment by bringing in all members of the project team.

## Informix Unveils Arrowhead

New all-encompassing product family to envelop XPS, new app server

BY ALAN ZEICHICK

On the eve of its eighth annual customer and partner conference in Orlando, Fla., Informix Corp. has announced its latest earnings, as well as a new Arrowhead product initiative and other upgrades.

This summer, the two-decade-old database company began reorganizing itself into two separate divisions: Informix Software, which continues to develop and market the database product; and a second division, not yet named, which would offer more comprehensive e-business products and services.

Taking into account charges of \$67 million for the third quarter, most of which the company's chairman, Peter Gyenes, said was associated with that re-

organization, Informix Corp. (www.informix.com) showed a loss of \$85 million on sales of \$211 million for the quarter. By comparison, the same quarter in 2000 showed a net income of \$25 million on sales of \$261 million.

In a public statement, Gyenes attributed the poor performance to many causes, not just the reorganization. "While we bore the burden of a post-Y2K slowdown



Arrowhead will be a replacement database for some customers, says Informix Software's Staff.

in demand of traditional client/server products and weak foreign currencies, the primary cause of the company's poor performance has been poor execution," he said, adding, "We now expect to return to profitability in the current [fourth] quarter, before previously announced charges, and to continue sequen-

► continued on page 36

## HP ACQUIRES BLUESTONE SOFTWARE

BY DOUGLAS FINLAY

Hewlett-Packard Co. has reached a definitive agreement to purchase Bluestone Software Inc., maker of the Total-e-Business platform, in a stock-for-stock deal designed to strengthen HP's position in the software and middleware markets. Holders of Bluestone stock will receive about one share of HP stock for every four shares they own in a deal said to be worth \$467.6 million.

The acquisition targets Bluestone's Internet-based technologies to become the integrating platform for HP's current software offerings, such as OpenView, an integrated network management application; Smart Internet Usage, an Internet tracking and billing system;

► continued on page 36



# DEVELOPER IQ TEST NO. 3

## DEVELOPER NO. 1

### QUESTION:

Which of these developers used Rogue Wave's DBTools.h++™ to develop a multi-database application?

Answer:  
Developer # 1  
of course!

## DEVELOPER NO. 2



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# IBM's alphaWorks Releases XML Technologies for Licensing

BY DOUGLAS FINLAY

Buoyed by its early success in releasing the XML parser for Java—when several hundred parsers were downloaded within days of the posting—IBM Corp.'s alphaWorks Web site for showcasing new technologies recently made six XML technologies available for licensing. These new

releases follow closely on the heels of the August release of IBM's XML Security Suite, which creates tables for securing digital signatures.

The six XML alpha technologies for which licenses are available are Xeeena, a visual XML editor that edits XML Document Type Definitions (DTDs); XML EditorMaker,

for creating visual Java-based editors in which to create and modify XML documents; XML Productivity Kit, for integrating XML documents into a Java development environment; XTransGen, for defining and storing the mapping relationships between two XML DTDs; XML Lightweight Extractor, for defining sources

of information for a particular XML document; and XML Master, which creates custom Java-based logic for the manipulation of XML documents.

"XML has been a major part of the alphaWorks Web site for some time now," remarked Daniel Jue, manager of the site ([www.alphaworks.ibm.com](http://www.alphaworks.ibm.com)), referring to the release of the XML parser for Java in 1998 as the beginning of IBM's XML open-source technology initiative. The XML parser now resides at [Apache.org](http://Apache.org).

He said the six new XML offerings were continuations of

efforts to meet quickly growing market demand for open standards and cross-platform applications, by allowing programmers to go deeper into IBM's alpha research technologies to use them commercially to embed in their products or services, and speed their products to market.

A one-time license fee of \$1,000 applies for each of the XML technologies. Earlier technologies available for licensing include ClassBroker, IRC Client for Java, SNA for Java, Tspaces and the XML Security Suite. ■

## RosettaNet Readies RNIF v. 2.0

BY DOUGLAS FINLAY

Even as it touts convergence of industry specifications created by groups such as Biztalk.org and the ebXML consortium, RosettaNet.org. was busy finalizing its own RosettaNet Implementation Framework (RNIF) version 2.0, which standardizes methods of exchanging business data. The final specification is due by mid-November.

"While other standards focus on vocabularies and schemas in describing how to build business documents and what should be in them, RosettaNet ([www.rosettanet.org](http://www.rosettanet.org)) provides more comprehensive specifications that address how those documents are exchanged among the trading partners," said Mitch Shue, RosettaNet's chief architect. To that degree, he said RosettaNet had made

its mark in addressing what he termed the process specification—or Partner Interface Process (PIP)—and creating the RosettaNet Implementation Framework for it.

Shue maintained that RNIF 2.0 would be aligned more closely with both Biztalk.org and ebXML technologies with regard to packaging and security. Ultimately, Shue said, RosettaNet's aim is to see that the standards promoted by both groups converge. "Because RosettaNet wishes to see convergence in the future with other specification bodies, we don't want to ignore what those other groups are doing." He said the other groups could do a better job of standardizing on transport protocols in the future, for instance, leaving RosettaNet to focus on process specifications.

On the face of it, new features appear to make RNIF 2.0 align more with ebXML, however. Shue said that new payload features would make the header XML-compliant, while the body could contain any type of file format, such as a CAD file or PDF file, provided in an S/MIME (Secure Multipurpose Internet Mail Extensions) package that includes encryption features. ebXML offers a similar protocol to its member companies. Shue did say he had had "collaborative though informal" discussions with Microsoft officials, who were interested in what RosettaNet was adding to 2.0.

Other new features include third-party content support, digital signature signing, transfer-level debugging headers and a quality-of-service element. ■

## AN ARCHITECTURAL DIGEST

Sun launches Dot-Com Builder Web site as clearinghouse for software design

BY DAVID RUBINSTEIN

Is there a new breed of software developer—one who must have expertise in all the emerging Internet technologies? Sun Microsystems Inc. thinks so, and has launched a community-based Web site to go beyond code writing to provide working knowledge of system architecture to those new Web developers and their managers.

Called Dot-Com Builder (<http://dcb.sun.com>), the new site is segmented into four main areas to provide information to users based on actual experiences of Sun customers who have tried to build Web applications and sites.

"Web development is no longer just about HTML and CGI scripts," said Lew Tucker, Sun's vice president of Internet Services. So, Dot-Com Builder, he said, gives practical, nuts-and-bolts information to the development team members whose responsibility it is to pull the myriad aspects of Web development together into an architectural plan.

Developers who are moving through the new site can find areas dedicated to best practices, community, resources and a technology guide, Tucker said. In the best-practices area, developers will find case studies, how-to's, interviews with chief designers and other real-world information about how these development teams built their Web

presence. The community area will feature discussion groups, polls and a directory of users with whom ideas can be exchanged. A resources section will have a product guide with links to vendors; technical support; and will provide an exchange for project outsourcing, in conjunction with eLance. Finally, the technology guide will include a reference section to other locations of the Web covering Java, Solaris, security and XML, with hot links to such resources as training sites and white papers, Tucker said.

"It's meant to be a best-practices site as well as a vibrant community," Tucker said. "When we ask developers where they get their information, by and large they say each other. They don't necessarily trust vendors" for the full story behind a certain technology or implementation.

Dot-Com Builder, Tucker said, doesn't replace Sun's current development sites, which he said emphasize programming and platform issues. Rather, he said Sun identified a need a level up that deals with system architecture. "Fundamentally, there's a belief within Sun that if we meet developer needs and help them become better developers, we think that's of strategic importance to Sun. It's also of value to our existing customers, who face these kinds of problems every day." ■

## SilverMark Adds Test Scripts to VisualAge

Does VisualAge pass the test?

Users for IBM's VisualAge for Java integrated development environment now have a new code-testing utility that plugs directly into their IDE.

SilverMark Inc.'s Test Mentor Java Edition is the company's newest offering, and is designed specifically to allow developers to test their applications as they code, according to SilverMark. From within the VisualAge IDE, Test Mentor provides a user interface for testing individual components by furnishing wizards and automatic test-code generation, including code generation from models built using Rational's Rose UML modeling software.

According to SilverMark ([www.silvermark.com](http://www.silvermark.com)), all of the test code is generated as Java code, and can be executed as stand-alone applications

Test	Pass	Fail	Skipped	Time
Test 1	100	0	0	0.00
Test 2	100	0	0	0.00
Test 3	100	0	0	0.00
Test 4	100	0	0	0.00
Test 5	100	0	0	0.00
Test 6	100	0	0	0.00
Test 7	100	0	0	0.00
Test 8	100	0	0	0.00
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Test 95	100	0	0	0.00
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Test 97	100	0	0	0.00
Test 98	100	0	0	0.00
Test 99	100	0	0	0.00
Test 100	100	0	0	0.00

Test Mentor users can test individual components while they code.

using Java classes included with Test Mentor.

Test Mentor Java Edition is available now, with prices beginning at \$1,250 per developer seat. The company also offers

versions of Test Mentor for the Smalltalk language designed to work with IBM's VisualAge for Smalltalk and Cincom Systems Inc.'s VisualWorks development environment. ■



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## ZEROCODE DESIGNS DATABASE APPS OVER THE WEB

BY ALAN ZEICHICK

Many Web-based application-development services have a catch: You have to host the completed application on their servers, perhaps, or pay them a run-time fee. Not so with Zerocode, a database development site from Ampersand Corp. The business model is to license its interactive code generator, currently in beta, as an interactive tool for developers—no more, no less.

"You can build as many apps as you'd like, deploy them wherever you want," said Allan Maxwell, Ampersand's vice president of business development, explaining that the company's primary business is database consulting. The Zerocode service ([www.zerocode.com](http://www.zerocode.com)) evolved out of tools that Ampersand's own developers use for building client applications, he said.

According to Maxwell, the Zerocode site lets developers create a basic database application, starting with the database



**Zerocode automatically captures a database's structure and data relationships, and uses them to build data access applications.**

design, without coding. Because the application runs on the enterprise's Windows NT/2000-based servers as a Java servlet, it can access existing enterprise data sources, such as DB2, Oracle or SQL Server databases, automatically capturing their relationships and data constructs. Once the basic database-access application has been created, developers can add business rules via the Web-based interface or by linking in custom Java objects.

"Zerocode is designed for intranet Web applications," said Maxwell. "It's ideal for anyone who has large databases they want to Web-enable. It's also good for making databases visi-

ble to business partners." He differentiates the applications developed by Zerocode by claiming that they're more robust than other Web-based offerings: "WebDB from Oracle enables you to go from a database structure to a single Web page," he said, "but it won't give you multiple Web pages, or maintain the relationships between multiple pages. Zerocode does that."

Zerocode is priced at \$10,000 per developer per year, with no limit on the number of applications built or where they can be deployed. According to Maxwell, the product should be out of beta before December. ■

## A Bounty on Your Head

Intellectual property rights challenged on Web as BountyQuest.com takes on patent disputes

BY DAVID RUBINSTEIN

The U.S. battle over intellectual property is as old as the Constitution, which gave Congress the power "to promote the progress of science and useful arts" through the awarding of exclusive rights to those works.

When patent applications are filed, it is the job of a patent clerk to research all that has been done before, to make sure the claim meets the legal requirements of new, useful and not obvious. This can be an enormously expensive and time-consuming task, and one that can result in businesses losing the ability to roll out a new product or technology, or in extreme cases, even survive. As technology and the Internet advance at a furious pace, with somewhere in the neighborhood of 2 billion unique Web pages, "all that has been done before" becomes larger and larger in scope.

Charles Cella, CEO of BountyQuest Corp., has his own spin on reform. He wants to turn software "experts"—developers and engineers, gurus and Ph.D.s, lawyers and companies—into bounty hunters, searching for patent or other intellectual-property violations that can be litigated, settled, refuted or defended.

Patent lawyers, when contacted over a dispute, often comb databases and hire outside researchers to test a new patent application against existing technologies. "We were supposed to leave no stone unturned," said Cella, who worked as a patent attorney at the Boston firm of Foley, Hoag and Eliot. "But digging for information is extremely expensive. So we thought, why not get the broadcast out there and ask people to look around them to see if the answer is there."

Thus was born BountyQuest.com, Cella's Web site dedicated to substantiating or refuting patent claims and applications. "How do you get the people with the knowledge to do the research for you? You make it worth their while," he said. Corporations seeking to validate or refute patent claims can take money that would be spent on attorneys and searches and offer it to people knowledgeable in a particular tech-

nology area as an incentive to come forward with information that relates to the claim.

The site was launched Oct. 18, and Cella said that before lunch that day, he received the first posting of a patent claim. For a posting fee of \$2,500 and a minimum bounty offer of \$10,000, companies can tap into a global base of knowledge to support or deny patent applications. If the posting yields a successful find, the bounty hunter receives the payment, and BountyQuest receives an additional 40 percent of the bounty from the offering party.

The Web site has two core purposes, Cella said. The first is to tap into knowledge of people all around the world and reward them for it. The second is to make the patent system work better. "Patents are a double-edged sword," Cella said. "We are rewarding innovation, but it also gives the legal right to suppress competition."

The stakes, he said, are high. The most classic cases involve companies whose operations are threatened by the filing of a patent application by a competitor. Last year, Cella said, more than 2,000 patent cases went to trial. He also cited a steep increase in patents in the Internet arena. In 1997, he said, only 150 patents were issued for Internet technology. By 1999, more than 10,000 had been awarded. Patents also were being issued in areas Cella said were previously thought to be nontechnical, such as business methods. Perhaps the most famous of these cases surrounds the "one-click" ordering method patented by Jeff Bezos of Amazon.com. Book publisher Tim O'Reilly criticized the patent, calling it bad for innovation and emblematic of what is wrong with the patent system. Both, interestingly, are investors in BountyQuest, on which O'Reilly has posted a bounty on Bezos' patent.

The Web site also provides a place where an inventor can post his or her idea to see if it already exists before undertaking the expensive and time-consuming task of filing a patent application. Information about patents, the patent process and a chat area also have been set up on the site. ■

## APIs Holding Back UDDI Spec

BY DOUGLAS FINLAY

It's all in the API, as testing and checking of the application programming interfaces are the only roadblocks to releasing version 1.0 of the newly formed Universal Description, Discovery and Integration (UDDI) registry standard specification, according to Bob Sutor, IBM Corp.'s program director for e-business standards and strategies and a member of the fledgling UDDI consortium.

More than 30 companies are working to adopt UDDI as a universal business-to-business registry access standard in which companies can communicate with one another to learn about business services each offers.

While a preliminary working specification has been available at the [www.uddi.org](http://www.uddi.org) site since the consortium's inception on Sept. 6, finalization of a standardized method for accessing a database registry that includes companies, their services and

the protocols they use to communicate is being delayed from release so that UDDI members can test to ensure all Web sites are interoperable. "When we are confident we have what we want in place, then we will release it," said Sutor.

Sutor maintained there will be two ways in which to access the database registries of the UDDI initiative to enable discovery of companies' services—going to a Web site and entering information about the business and its services from a browser, or querying through a database. "We really expect users will query through the database, and that's why we have the APIs," he said.

With Ariba Inc., IBM and Microsoft Corp. servers being utilized to store the UDDI database registries during the initial specification development, once the APIs are completed and put in place they must be tested to see they accurately access the data requested from each of the

three vendor servers. Sutor further suggested that updates to the registry data will need to be synchronized at least once per day so that it will be the same data regardless of what server it is accessed from.

UDDI will use the Simple Object Access Protocol (SOAP) to enable any company to contact the registries and get a response. Because data in the registries is in XML, Sutor said, SOAP was found to be the best method for transporting the data in the registries. But he also said that once companies learn about one another through the registry, they will be free to utilize other transport protocols such as those from ebXML and Rosettanet to communicate among themselves.

"Not only will the registry find a suitable company that offers services compatible with another company's needs, but it will find compatibilities in the way the companies can do business with one another," he said. ■

# Storm Evolution

## Movement

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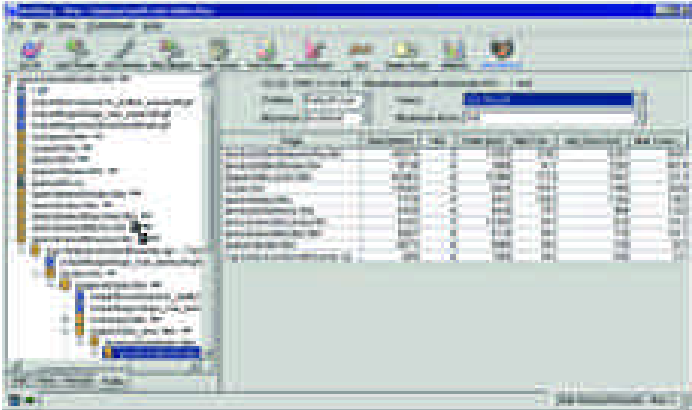
# Parasoft Prepares WebKing Upgrade

## Version 3.0 measures performance, validates XML data

A properly functioning Web site is critical. In the case of a small site, or one based on static pages, it's pretty easy to see if the HTML code is correct and that none of the links are broken. It's more difficult, however, to thoroughly test dynamic Web sites.

One problem is that the Web sites are built, deployed and modified incrementally, often

without much testing. Another is that tried-and-true techniques for performing QA on client/server applications may not work on Web sites filled with tiny bits of code written in scripting languages, many of which rely upon external services to provide their functionality. When new technologies like XML become involved, the problems grow even trickier.



WebKing reports on the performance of individual Web pages and scripts.

Parasoft Corp.'s answer is an upgrade to its WebKing testing tool. The new version 3.0, which entered beta at the end of October, adds the ability to validate XML data to its test-case scenarios. The new version also can perform load testing of either an entire application, or of individual units as they're developed. According to Parasoft (www.parasoft.com), the tool performs both black-box and white-box testing, making it applicable for validating the construction of a Web site during development, as well as ensuring that a deployed site remains error-free.

According to company spokesperson Paula Moggio, WebKing 3.0 might be completed by the end of 2000 or early January 2001. Pricing starts at \$15,000 for 100 developers or testers. ■

# 'Last Call' on WebDAV Protocol

## Draft of version-control spec goes to IETF working group

A final draft of the standardized versioning specification of the Web Distributed Authoring and Versioning protocol was submitted to the Internet Engineering Task Force (IETF) on Oct. 1, and its acceptance now is expected early next year, according to Geoff Clemm, chief software engineer at Rational Software Corp., who wrote the specification.

When completed, WebDAV will allow for Internet-based authoring and versioning for tasks ranging from simple document management to collaborative software development and configuration management.

The version 10 specification is undergoing a final review period that could last six or seven weeks, after which any clarifications or modifications will be made before it goes to the IETF's Steering Group for finalization as version 11.

Clemm said Rational (www.rational.com) has worked with IBM Corp. on an implementation based on version 4 of the WebDAV spec that should be released in the spring of next year. "We wanted to get going architecturally, as well as have something to show IETF as far

as a higher level of interoperability goes," Clemm said.

The implementation of VisualAge for Java, integrated with Rational's ClearCase, does not have advanced versioning capabilities, and things such as activities and change sets won't show up in that implementation, Clemm explained. He said the companies will work to get the VisualAge for Java implementation up to speed with version 11 after it is finalized.

Among the companies working on aspects of WebDAV with Rational are IBM, Macromedia, Merant, Microsoft and Oracle. The open-source community has embraced the idea of collaborative Web authoring "by revisiting the whole architecture of CVS to make it appropriate for use on the Web," Clemm said. CVS, an open-source library system, is limited because it talks only to CVS clients, he said.

The need for WebDAV, Clemm said, came about because there is only one standard for versioning, the Microsoft Source Code Control Interface (MSCCI or SCC), which he said works only on Windows and is not even supported by Microsoft. "It's used," Clemm

said, "because it's the only choice, and it's written to the lowest common denominator." SCC is a COM interface, Clemm explained, that if used as a client, can plug only into any Microsoft server that supports the interface. "A browser-based interface isn't desirable," Clemm said, "because you can only do check-in and check-out, and it can't do client-side editing and compiling. It's a clumsy architecture."

The open-source movement has embraced the concept and is working on something called Project Subversion (http://subversion.tigris.org), a rearchitecture of CVS that allows for a higher level of configuration management without a central controlling mechanism, he said. Added features to CVS are the ability to handle directory changes, file renames and other changes to metadata; shortcuts and multiple hard links; commits that will not take effect until the entire commit has succeeded; and the ability to remember merges.

Also, a WebDAV module in Apache 2.0 is being upgraded to handle the new versioning extensions in the protocol, Clemm said. ■

## News Briefs

### COMPANIES

**Percussion Software Inc.** agreed to partner with **Information Architects Corp.** (IA) to combine Percussion's Rhythmyx Content Manager for XML with



IA's SmartCode content delivery system to provide real-time syndication and aggregation of content from varied data sources for distribu-

tion to Web sites or mobile devices such as cell phones or handheld computers, without the need to replicate business logic. Further, Percussion will license IA's PDF-to-HTML converter for resale to its customers . . . E-business applications provider **RightWorks Corp.** has agreed to a development partnership with **Vignette Corp.** to integrate Vignette's V/5 e-business application platform, including eBizXchange transaction and process tool, eContent management tool and elntrate technology, into the



RightWorks application suite . . . Linux distributor **Caldera Systems Inc.** has certified **Oracle Corp.**'s Oracle 8i database to run on Caldera's OpenLinux eServer 2.3 to offer Linux users a low-cost Internet application development and deployment platform featuring



a suite of enterprise products. Meanwhile, Oracle is also seeking certification from Caldera to run Oracle's Internet Application Server 8i (Oracle iAS) on the OpenLinux eServer . . .

**Sequoia Software Corp.** has formed an alliance with **Software Technologies Corp.** (STC) to port STC's eXchange eBusiness Integration Suite to Sequoia's XPS XML server. STC claims that its suite will enable Sequoia customers to tightly integrate XPS with enterprise applications to eliminate the need for customizing applications, resulting in lower costs to Sequoia customers . . . **Enterprise Commerce Software Inc.** has joined **Cerebellum Software Inc.**'s technology partner program to enable Enterprise Commerce customers to map prebuilt e-



commerce components to a back-end data source without the need to write code, using Cerebellum's Internet Data Integration (IDI) technology . . . **Metro Link Inc.** has formed a strategic alliance with **OnCore Systems Corp.** to implement Metro Link's X-Window System server with OnCore's operating system with embedded Linux and Unix capabilities. The combination will provide a complete graphical solution to customers in the mission-critical and avionics communities requiring full-featured platforms and FAA-RTCA/EUROCAE DO-178B certification . . . **Sun Microsystems Inc.** has released StarOffice source code to Open-

Office.org to enable programmers to build improvements into the suite and contribute new components. Sun also released XML file formats and StarOffice API specifications . . . **Zucotto Wireless Inc.** is partnering with **NTRU Cryptosystems Inc.** to port NTRU's security technology to Zucotto's Java-based Whiteboard software development kit. The combined technologies are seen as providing sophisticated security encryption to programmers developing embedded wireless applications . . . **Aladdin Systems Inc.** and **Conducent Inc.** will jointly create an SDK for use for MacOS that will provide free ad-supported software to Mac users. There will be no license fees charged for the SDK. Advertising banners, animation and other advertising content provided by Conducent can appear in any part of the software application's user interface. Aladdin, which makes the StuffIt Expander utility program used on the Macintosh OS, will develop advertising software components under license from Conducent.

### PRODUCTS

The **EAServer** from Sybase Inc. has passed Sun Microsystems Inc.'s Java 2 Enterprise Edition platform compatibility test suite. Sybase



claims that EAServer provides support for the J2EE specification, including Enterprise JavaBeans, Java Servlet, Java Naming and Directory Interface components, JTS, the Java Transaction API and JDBC. The EAServer 3.6.1 is scheduled to ship this month; deployment pricing starts at \$2,995 . . . **NQL Inc.** has released a beta version of its **Network Query Language for Java** (NQL Java Edition) for the Linux operating system. Targeted for desktops and servers where Java 2 has been > continued on page 30





## The XML Platform for Electronic Business

The Tamino XML Platform is a comprehensive set of products for building enterprise-scale XML-based applications. It consists of storage, development and integration components for XML data and applications. The engine of the platform is Tamino XML Database, the only native XML database management system available on the market today. The platform's flexible framework enables rapid implementation of robust, high-performance mission-critical electronic business applications based on XML standards. It is designed specifically for building applications where reliable and fast storage and exchange of XML documents are absolutely essential, for example in supply chain management, document management, electronic publishing, electronic sales systems and many other B2B applications.

### PLATFORM PRODUCT OVERVIEW

The Tamino XML Platform consists of three product groups for:

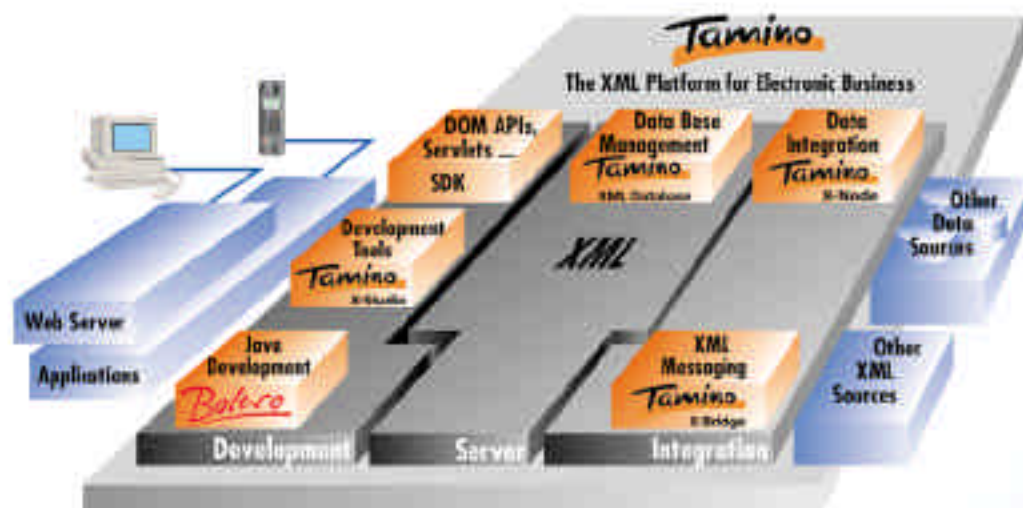
- database management;
- application and data integration;
- application development.

The database management component is Tamino XML Database, dedicated to storing, publishing and exchanging any kind of structured or unstructured data.

For integration, the platform employs Tamino X-Bridge, for the transformation and routing of XML documents between applications, and Tamino X-Node for the integration of traditional data sources (e.g. SQL databases) into the XML World. As one of the platform's development components, Tamino X-Studio provides a complete tool-set for conveniently creating and managing XML documents and Java-based electronic business applications.

### STORING NATIVE XML

The centerpiece of the platform is Software AG's Tamino XML Database, which was designed specifically to store structured information in native XML format.



Storing XML documents in their original structure in Tamino XML Database results in faster response times. This represents a decisive difference with respect to traditional databases, which are retrofitted with proprietary conversion layers to enable XML document storage. It is not surprising then that this patchwork solution does not scale well, particularly with increasing transaction rates and document complexity. Users pay the ultimate price in speed and reliability. With Tamino XML Database, XPath-based queries can simply be applied as part of a URL, resulting in rapid

and reliable search and retrieval. The ability to cope with high access loads in mission-critical applications and to deliver information in any target format for any output device are also features that set Tamino XML Database apart. In addition, Tamino provides server extensions for accessing remote applications or programming custom server-side functionality such as event-triggered data processing or predefined complex queries in Java or C++. Tamino XML Database scales from Windows NT / Windows 2000 platforms through Unix and soon to Mainframe-based operation.



## INTEGRATING DATA

Enterprises extending their business to the Internet typically must integrate existing back-end data stored in hierarchical, relational and object databases. The Platform's X-Node component provides users with a single server view of business data residing in both the XML Database and the above-mentioned external data containers. Reading (or writing) data through Tamino X-Node includes real-time conversion of externally stored data into (or from) XML data streams.

## INTEGRATING APPLICATIONS

Exchanging XML documents with customers, suppliers and business partners over the Internet is key in the networked economy. Tamino X-Bridge provides a central communication hub for enterprise-level XML-based B2B information exchange. According to user-defined rules, the content and structure of XML documents are analyzed and routed to the appropriate receiver at low cost and without human intervention. Content-based routing rules use the values of specific XML elements and attributes, whereas source-based routing uses either the sender's TCP/IP network address or digital certificate information. Transformation of the original XML message is sometimes necessary to ensure that the data is delivered in a format that the receiving application understands. Tamino X-Bridge uses standard XML document transformation based on the XSLT standard.

## DEVELOPING XML APPLICATIONS

The Tamino XML Platform is supported by a number of application development tools that are specifically geared to the requirements of

programmers creating XML-centered applications. The tools, some provided by Software AG and some by partners, are tailored to the different roles and skills of electronic business application developers. The Software Developer's Kit (SDK) provides all necessary functions to develop application-specific interfaces for access to Tamino in C, C++ or Java (e.g. basic SAX and DOM APIs in Java, JScript, Perl or ActiveX).

Tamino X-Studio is available for Windows NT and Windows 2000 Professional and allows for rapid development of scalable XML-based applications and for building XML-related documents or XSL style-sheets (e.g. for X-Bridge transformations). It includes an easy-to-use application-generation wizard as well as an integrated set of complementary standard XML tools from technology partners. These are XML editors and schema editors (XMetaL, XML Authority, XML Instance, XML Console), a stylesheet editor (Stylus), and an XML-to-language data-binding tool (Breeze XML Studio). The latter allows object-oriented programmers to access XML data stored in the XML database without knowledge of XML structures or rules.

Bolero is a Java-based development environment for building professional, mission-critical J2EE-conformant applications. Bolero gives applications direct access to heterogeneous IT systems, such as relational databases, ERP systems and diverse component models. It perfectly integrates with Tamino XML Database and supports entire development teams that need to access a common database (team repository) holding all available Bolero objects.

## STANDARDS-CONFORMANT

Communication to/from Tamino XML Database or Tamino X-Bridge is based on Internet standards such as HTTP and TCP/IP. Administration or user access to the XML database is possible using standard Java-enabled Web browsers.

While Tamino products for various development or integration purposes follow their respective standard recommendations, such as XSLT, XPath or DOM (level 1), ODBC, JDBC or DCOM, all Tamino XML Platform products are compatible with the W3C recommendation, XML 1.0 and conform to the Unicode standard for internationalization. Furthermore, Bolero is J2EE-conformant, supports the Java servlet standard and multiple component models such as EJB, CORBA and DCOM. As standard recommendations change or new ones become available, Tamino XML Platform products will be adapted accordingly.

## FREE STARTER KIT

The XML Starter Kit is free of charge and integrates all products necessary to start implementing XML solutions quickly. All components described above (and more) are available as time-limited evaluation versions. Just register at the Software AG corporate website for your personal copy.

<http://www.softwareag.com/xml-starterkit>

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# Embarcadero Buys Advanced Software, Narrows O-R Gap

BY DOUGLAS FINLAY

In a move designed to narrow the gap between object and relational database modeling, Embarcadero Technologies Inc. signed a definitive agreement to acquire Advanced Software

Technologies Inc. for \$13 million in cash. The purchase, expected to fortify Embarcadero's position in the Java development community responsible for building e-business applications, will enable Embar-

cadero customers to create synergies between its ER/Studio data modeling product and Advanced Software's GDPro object modeling product.

Stephen Wong, Embarcadero's chairman and CEO,

said of the purchase that its ER/Studio customers were showing increasing interest in building software that could help deliver Java and Web-based applications. "The addition of Advanced Software will enable

us to better satisfy these market demands while strengthening our position across the database application life cycle."

Greg Schottland, Advanced Software's president and CEO, claimed the acquisition would benefit both companies by providing additional value to other companies looking for overall solutions to e-business applications and database modeling.

The acquisition will propel Embarcadero ([www.embarcadero.com](http://www.embarcadero.com)) squarely into the Java community by enabling it to offer the GDPro product as a Java-based solution. Cameron Skinner, Advanced Software's chief technology officer, said because of GDPro's Java features and rich data modeling, programmers could quickly model their database requirements and couple them with object modeling to manipulate the database. Combining both, he said, would provide a level of functionality superior to each product's individual capabilities. He also maintained that reuse of components would enable less-skilled programmers to be more productive when using GDPro. The Advanced Software name was expected to remain until the new year. ■

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## VISICOMP UPDATES JAVA DEBUGGER

If seeing is believing, then VisiComp Inc.'s new VisiComp 1.5 Java Software visualization tool permits programmers to see exactly what's happening to their programs at run time, and catch otherwise elusive bugs to speed production times.

Written in Java, VisiComp 1.5 features a GUI offering boxes and arrows that represent object and reference variables. Instance variables that are displayed in the "object boxes" are updated automatically as the program under observation modifies its values. The dynamic display of complete data structures also permits programmers to fix servlets by displaying bugs at run time.

Version 1.5 can also be used to comprehend legacy code to provide programmers with an understanding of how code was written by other programmers. In addition, it reveals memory leaks and verifies correct functionality.

Available now, the cost is \$495 and comes with one year of free upgrades. ■



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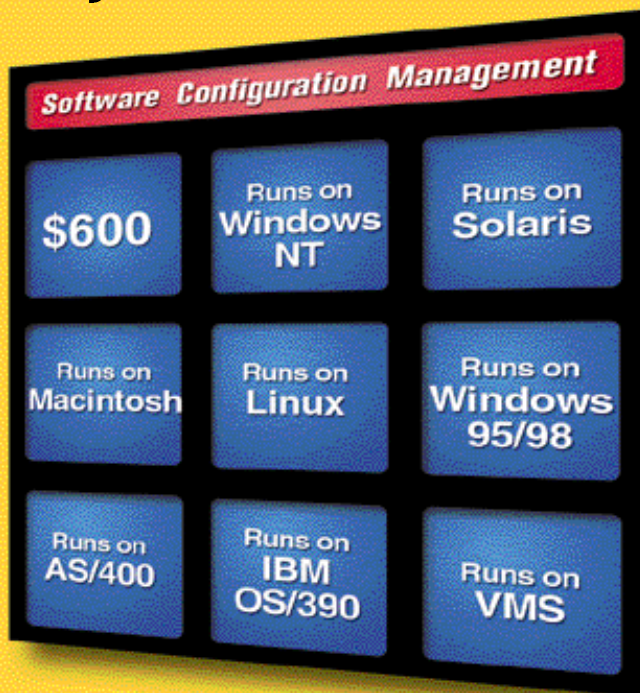
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# IT: Phone Home on Projects No More

## FootPrints v. 4.5 eliminates remote calls over phone, wired Web

BY DOUGLAS FINLAY

Remote calls are out.

Programmers and development managers working remotely will be able to share

information about projects without the need for remote calls into corporate networks, thanks to Unipress Software Inc.'s wireless/pager support in its newly

revved FootPrints v. 4.5 Web-based project tracking software.

Other features of 4.5 include more flexibility to create ad-hoc escalation, remote control and

instant messaging, and customizable browser screens to present information in a more personal format.

FootPrints is targeted at

large development departments that require project management—such as tracking when source code is checked out for use, who last worked on code, and which projects programmers are currently working on—tied into their source-code management strategies. Mark Krieger, Unipress' (www.unipress.com) president, said the new wireless support was designed to enable both managers and programmers to have access to project information and files while in the field without making remote calls into corporate systems.

"If a manager or programmer is on the road with their handheld computer and without access to the Web, and they want to check their assignments, their priorities or updated work tickets, they can do so through the handheld using e-mail," said Krieger.

Yet, while remote is eliminated with one feature, it becomes the boon of the new live chat feature in 4.5. Unipress vice president Fred Pack explained that a manager in one office, while in communication with a programmer in another office, could invoke the remote control feature to receive a copy of the programmer's screen in which a job was executed, then use the remote chat feature to discuss the contents on the screen. "Once the manager has seen the screen using the remote control feature, he can use the live chat box to discuss the errors he finds in the way the job may have been handled," Pack said.

Also new to FootPrints v. 4.5 is increased flexibility in escalation. "Managers and programmers can now create ad-hoc escalation," Krieger said, "in which the program will remind the user at a predetermined time in the future designated by him what the status of a job in progress is."

Rounding out the enhancements found in 4.5 are customizable screen features. "Managers and programmers can list all the active tickets currently in the queue, such as the tickets assigned to him or her, or tickets assigned to others in the development team," said Pack.

FootPrints v. 4.5., available immediately, is priced at \$995 for the first three programmers and \$795 for the next three programmers, and offers a sliding price scale as more programmers are added to it. It is available immediately. ■

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# Recipe for Early Success

A childhood with IBM PCs results in a 23-year-old's hot start-up

BY DAVID RUBINSTEIN

Sameer Samat grew up in a box.

More specifically, one of the first IBM Personal Computers. "My dad worked for IBM," he explained. "So when the first PC came out, even though it was really expensive, we were the first kids on the block to get a PC."

Now, Samat is on a course to make enough money to buy that block. Yet the route this remarkable 23-year-old has taken seems rather, well, unremarkable.

When Samat was in first grade, his family moved to Germany, where he did not know the language or any other children. "It was isolating," he said. "It was me, my family and the computer." A year later, his family moved again—to San Jose, Calif., where Samat befriended Sean Brady. The three of them—Samat, Brady and the big beige box—quickly became inseparable, even though as Samat recalled, there were only about three things you could do with the computer.

"The blinking cursor, when you're a kid, is quite an attraction," said Samat. "Kids can learn languages quickly, so we just started hacking. As a kid, you've got the time." So Samat and Brady began hacking and were programming by the sixth grade, when they were joined by their friend Josh Dammeier. "All our dads and moms worked at computer companies, so we were sort of bred to think this way, if you will," Samat said.

It seemed a natural progression then, that when the time came for a decision on colleges,



Friends and company founders Chris Harris, Sameer Samat, Josh Dammeier and Sean Brady have millions of reasons to smile.

the boys decided to major in computer science, enrolling at the University of California at San Diego. "We could do a lot without knowing the theory behind it," Samat recalled. "We learned how, but not why." At college, the boys met Chris Harris, who also was looking forward to a future in computer science, and their journey accelerated.

During their course of study, they came upon what they believed was a huge hole in the software market. "The things they tell you in class about object-oriented design, everyone talked about reuse." But the boys found that there was no code to reuse; there was no repository of source code to tap. So pooling their expertise in information retrieval and database building, the four friends began working on the technology that would allow them to search out and store source code from the Internet.

Summers, meanwhile, were split between signing up for the usual internships and deciding to develop their own technolo-

gy. "They play games with you," Samat said of the technology companies. "Under the table, they're telling you not to go back to school, and our friends were saying things like, 'Why not just go to work for Microsoft and make a lot of money?'"

## READY FOR SUCCESS

Over the summer of 1999, the friends completed work on their content aggregation technology, and Sourcebank, their code search engine and repository, was created. That was only the beginning, however. The boys saw that their technology could be applied not just to gathering source code, but to searches particular to any vertical market. "Our technology is based on artificial intelligence and machine learning," Samat explained. "We train the software to perform different functions in different markets, but the code is the same and the engine is the same. It's very data-driven."

By Aug. 1, the site was

deployed. "It was very home-grown," Samat said, adding, "I wrote the first press release." The boys were putting in 80-hour workweeks. The company hit the radar in a hurry. "We had two acquisition offers in the first week, and VC guys were all over. For four college students, it was a lot of money."

It was somewhere in the neighborhood of \$4.2 million, the bulk of which was provided by Windward Ventures. "If no one told you Samat was 23, you'd never know it," said David Titus, managing partner of Windward. "He had developed very quickly a technology platform and a customer. We like customers. They're the best judges of technology there are."

Titus said his firm liked the fact that the boys had brought in an experienced CEO, Neil Senturia, that the firm knew and liked. Senturia last year sold ATCOM/INFO, his software and services company, to CAIS Internet Inc. for more than \$100 million and had gone into semi-retirement. "I played nine rounds of golf in four days and I was done," he said. Enter the boys.

"They sent me a five-page plan, but one sentence really interested me," Senturia said. "So we get to a meeting, and they have six computers, miles of Ethernet cable and 29 pizza boxes. I said, 'Turn to page 3. See this sentence? If you can do this, I'm in.' The sentence said, 'We can do this across multiple applications.' It wasn't just endemic about source code."

Senturia said offers kept coming in. "In mid-March, we had a deal where it looked like we could get \$40 million," he said. "I said to them, 'Do you want it, or do you want to keep going?' I felt like Regis Philbin.

That was a defining moment."

Sourcebank ultimately begat Mohomine, which is the company that develops content aggregation tools across the vertical markets. Samat explained that Mohomine builds topic-specific databases by mining the Web, and then licenses them to customers. His example: When you search the Web for information on Java, you find out more about coffee shops and Indonesian jewelry than you do about a programming language. "The Web is growing at an explosive rate, and the tools that currently exist to manage and organize content aren't going fast enough," Senturia said. "Water's pouring in and we're bailing out with a thimble. Now we've come up with an automatic pump. That premise was sufficient to raise money and create a company."

Samat is humble about his success—his company has grown to 50 employees, including 31 software engineers, and the boys are earning way more than most 23-year-olds. "I have a used [Acura] Integra," he said.



The boys landed a big fish when they brought in Neil Senturia as CEO.

"We're just having a good time, making sure the technology was fun to work on."

Sameer Samat and his friends still enjoy living in the box, the place of their childhood. Only now, it's a much bigger box. ■

## RATIONAL

◀ continued from page 1

but for requirements and test assets as well. ClearCase LT costs \$1,500 per seat, a price point he claims makes it more accessible to smaller shops.

Another new initiative from Rational is called Quality By Design, which emphasizes testing early and often during a development project. The company is introducing the Quality Architect testing tool, which is included in Rational's Development Studio set of products, a subset of the entire Rational Suite. The Quality Architect, Taylor said, allows for compo-

nent testing even when other components are not yet finished. "We're really building component validation right into the modeling phase," he said. "Most problems are found late, when they're expensive to fix. We use an iterative development process to catch problems earlier on, with testing at the component level." Quality Architect works within Rational's Rose Enterprise Edition modeling tool to create test drivers and stubs that can emulate incomplete EJB and DCOM/COM+ components.

Rational has also released Purify for Java, a memory profiler that targets how much

memory is consumed by an application, where it is consumed, and identifies if and when a forced garbage collection would help performance. With byte-code insertion capability, precompiled source code is not necessary; the tool can work off an executable only, Taylor explained.

## SUITE CUSTOMIZATION

The Suite 2001 includes an API for enhancements, plus the Rational Process Workbench, which is a tool for customizing the Unified Process, giving customers greater flexibility to tailor the tools and processes to their specific needs, Taylor

said. Also, a detailed road map for building applications using the suite tools for IBM WebSphere is built in, as are guidelines for developing to the Microsoft .NET platform. In addition, the Rose modeling tool includes a new Java framework for Java 2. A developer can specify which Java platform he is working in, and a Rose wizard will prepopulate the model with the appropriate Java classes, reducing the reliance on handwritten code, Taylor said. "It automates the error-prone and mundane part of Java development," he said. Further, he added, a developer can create a Java class in the

model and specify whether he wants to create a session or entity bean, and the tool will automatically expand the class to add more classes or associations required to complete the object. The developer can then use his IDE of choice to add business logic and complete the application, he said. Developers can test deploy a single EJB-JAR file, facilitating testing against any Java-compliant application server.

Prices vary, based on whether a customer purchases an individual tool, an individual studio or the entire suite of products, but Taylor said prices have not increased since the May rollout. ■





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The Embedded Linux Experts.

# Sun Heads for Home

OSGi-compliant JES 2.0 offers OEMs, ISVs gateway platform

BY EDWARD J. CORREIA

Are you ready for an Internet lifestyle?

If so, the first thing you'll need, says Sun Microsystems Inc., is a residential gateway. And there to provide one is the Java Embedded Server 2.0, the latest version of Sun's OEM-targeted home gateway software platform, which is now OSGi-compliant.

The Open Services Gateway initiative (OSGi), founded in March 1999, is a multivendor effort to standardize the way home appliances and computing devices communicate, and a necessary step in home automation. The OSGi specification provides the framework to enable service providers to securely deploy and manage multiple applications and services on a gateway device.

"It's about managing the next-generation Internet lifestyle, so to speak, when everybody's always connected whether they're in their car, on their cell phone or at home," said Raj Mata, senior manager, of product marketing at Sun, who listed some of the managed services made possible by the platform, such as entertainment-on-demand, home secu-

urity and energy management.

Part of that lifestyle, he said, might depend on application interdependencies, which Mata illustrated using the example of an audio-on-demand application that depends on a billing service. If the audio program is requested and the billing program is not resident in the gateway, "the framework will automatically load the service from the network," he said.

JES 2.0 is Sun's first foray into OSGi compliance, and forms the basis, Mata said, for allowing OEMs to build gateway devices that bridge the gap between broadband networks like DSL and cable on one side, with home-device networks such as Home Audio/Video interoperability (HAVi), UPnP, Bluetooth, wireless Ethernet and Sun's own Jini specification on the other. "As the market evolves, I think there are going to be multiple networks in the home to start with," Mata said.

Mata described Sun's vision of the networked home: "Your entertainment cluster—your audio/video devices—will probably be on a HAVi network in the home. Your energy manage-

ment, home security and heating controls will probably be on a power line network, and your messaging and telephony services are going to be on a phone line network. JES is designed to work with all these technologies simultaneously, and can dynamically detect all of those technologies and devices on those networks." Device builders, he continued, need only provide

## Spyker Traces Non-Instrumented Code

Think of it as caller ID for embedded systems.

Embedded RTOS developer LynuxWorks Inc. has released Spyker, an event trace and visualization tool for debugging LynxOS, Blue Cat Linux and other Linux distribution kernels and applications, all without modification to source code, according to the company.

LynuxWorks (www.linuxworks.com) claims Spyker to be the only commercial trace tool that can deliver trace data without an instrumented kernel or libraries. Similarly, LynuxWorks says the tool can display application event traces without

the appropriate physical connections from the gateway to the target device.

### OEMS ON BOARD

Invensys Control Systems, which produces home control systems, has licensed JES 2.0 and will collaborate with Sun to build ControlServer 2, a residential gateway device based on the Sun platform that will reportedly include a power line network bridge. Sun also is working with network automation company Echelon Corp. to adapt JES to Echelon's LonWorks platform

for industrial, transportation and home automation. Sun also has been working with Sony Corp. to bring JES capabilities to the HAVi specification.

Mata said that although the fledgling OSGi standard does not yet have a certification process, JES has passed all available OSGi compliance tests.

Available now, the single-user version of the JES 2.0 developer edition, which includes the Forte for Java community edition Java IDE, can be downloaded at [www.sun.com/software/embeddedserver/buy](http://www.sun.com/software/embeddedserver/buy). ■

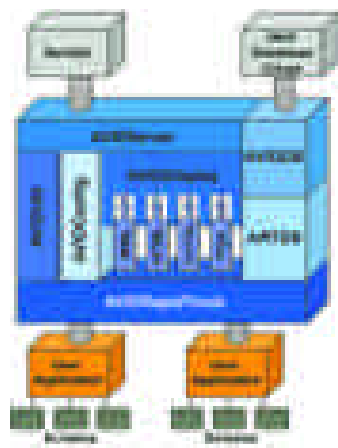
## AVIDWireless Simplifies Mobile App Development

BY EDWARD J. CORREIA

Mobile programming and network tools vendor AVIDWireless has released AVID RapidTools, a Java-based toolkit that the company claims will allow developers to create applications for mobile devices that are independent of device type and display format. AVIDWireless is a division of VoiceDataWare Inc.

AVID RapidTools reportedly consists of a platform-independent Java server component and a set of JavaBeans for handling multiple server connection sessions, user personalization and data access. Among the beans is AVIDDisplay, which is responsible for formatting output for a particular user display.

The key to making this possible, according to the company ([www.avidwireless.com/ARTearlyrelease.htm](http://www.avidwireless.com/ARTearlyrelease.htm)), is a set of server-side methods (functions within JavaBeans) that are called by the mobile application that per-



Custom plug-ins let a single application service many device types.

mit it to interact with the device, and which in turn call a plug-in for the appropriate device. This plug-in architecture is extensible, and will initially include support for HTML, iMode/CHTML, Palm Vii/PQA and WAP/WML.

Rodney Montrose, AVIDWireless' founder and president, said that all too often he has found that while IT staff has

plenty of knowledge, it isn't always the right knowledge for creating mobile applications. "The average IT shop understands their customers' needs, but not necessarily wireless or Java [technologies]," he said. "AVID RapidTools allow IT [people] to produce applications which work on almost every mobile device." A development kit also includes program templates that the company says permit staff developers with no wireless programming experience to quickly generate useful applications using an English-like syntax.

To deploy the tools, the server must be equipped with any Java 2 platform, the Java Servlet API 2.1 or later, plus a JDBC driver for an existing database, the company said. The full set of AVID RapidTools, which includes a single server license, developer kit, all available plug-ins and documentation, is priced at \$4,995. The developer kit alone costs \$495. ■

### LYNXWORKS

#### FILES WITH SEC

In related news, LynuxWorks last month announced that it

## JBuilder 4 to Target Palm OS Devices

Playing to a captive audience of 70,000 Palm OS developers, Inprise Corp. has released an updated preview version of JBuilder Handheld Express, an extension to the newly released Borland JBuilder 4 rapid development environment that will permit JBuilder users to target the Palm platform with J2ME-compliant applications.

According to the company, the extension will feature a set of wizards to steer programmers through the development of applications conforming to Sun's Java 2 Micro Edition specifications. JBuilder 4, which was released in September with a bevy of new features including J2EE JavaBean development support, will support all of Sun's device profiles, including the mobile informa-

intends to go public. The company has filed a registration statement with the U.S. Securities and Exchange Commission relating to the proposed initial public offering of its common stock.

If approved, the shares will be offered by an underwriting group managed by Deutsche Banc Alex. Brown, Prudential Volpe Technology Group, Dain Rauscher Wessels, and ABN AMRO Rothschild LLC, a company report stated. LynuxWorks has been a privately held company since 1988 when it started as Lynx Real-Time Systems. It renamed itself in May. It has been financed by both private and corporate investments from Intel, Motorola, TurboLinux and others. ■

tion device profile currently under development through the Java Community Process. Applications will run on any device that contains a run-time environment for Sun's connected device limited configuration specification, the company said.

The updated preview version of Handheld Express for JBuilder 4 can be downloaded now for free at [www.borland.com/jbuilder/hhe](http://www.borland.com/jbuilder/hhe). The JBuilder 4 development environment includes Linux, Solaris and Windows host versions in a single box. The JBuilder 4 Foundation entry-level version, which includes an editor, compiler and debugging capabilities, is free for download at [www.borland.com/downloads](http://www.borland.com/downloads) or can be ordered on CD-ROM for \$49 with manuals. ■



# SQL for Windows CE Is Released

Microsoft's enterprise-class relational databases aimed at handhelds

BY EDWARD J. CORREIA

With last month's Professional Association for SQL Server conference to set the stage, Microsoft Corp. released SQL Server 2000 Windows CE Edition, opening doors to a new set of database-aware applications for Windows CE developers to build.

Developers currently using Microsoft SQL Server development tools will feel at home with the Windows CE edition, according to the company; it employs a similar API, interface

and SQL grammar. In fact, the skill set required to develop solutions is similar to those of Visual Basic or Visual C++, the company said.

Microsoft's handheld version of SQL preserves support for transactions and varied data types, features an optimized query processor, and can occupy 1MB of device memory. However, memory consumption could reach as much as 3MB depending on processor and selected components, Microsoft said.

Client software will operate

on devices running Windows CE version 2.11 or later for the Handheld PC Pro and Palm-size PC platforms. Windows CE 3.0 or later is required for the Pocket PC. Suitable servers are equipped with Windows 2000 or Windows NT 4.0 Service Pack 5 or later.

Microsoft says the SQL Windows CE Edition can service clients whether or not they have a persistent connection to a server. It does this through the data synchronization functions of remote data access (RDA) and

merge replication components, both of which support HTTP and encryption. Both components can be found in SQL Server 2000. However, SQL Server 7.0 and SQL Server 6.5 with Service Pack 5 or later support SQL Server for Windows CE but do not support merge replication.

Developers need to be equipped with a Windows NT/2000 workstation (Windows 98 does not support Windows CE desktop emulation) and Embedded Visual Tools version 3.0 installed with at

least one of Microsoft's Palm-size PC, Handheld PC Pro or Pocket PC SDKs installed.

Licensing of SQL Server 2000 Windows CE Edition is covered under the SQL Server 2000 Developer Edition, which is priced at \$499 and includes unlimited deployment of the SQL client software to Windows CE devices. According to Microsoft, devices also may connect to back-end servers if those servers are covered by a per-processor SQL Server license or if the client has an SQL client access license. Evaluation and full versions of Microsoft developers' products can be ordered from <http://developerstore.com/devstore>. ■

## Wind River Captures Dragonfly

RTOS giant acquires expert VxWorks consulting firm

Embedded developer Wind River Systems Inc. continues to grow through acquisition. The latest bug to hit the RTOS giant's windshield is Dragonfly Software Consulting Inc., most of which Wind River acquired last month in an all-cash transaction. Details were not disclosed.

Dragonfly, which was formerly based in Beaverton, Ore., had specialized in Unix software design and implementation. The company was working mainly to implement Wind River's Tornado development environment and VxWorks RTOS on various microprocessor families, a Wind River ([www.windriver.com](http://www.windriver.com)) report said.

Wind River, which characterized the consulting firm as being expert in VxWorks, had recently designated Dragonfly as its MIPS engineering team, in recognition of its work with Wind River's MIPS Center for Excellence microprocessor-maker partnering initiative, and for its extensive contributions to the beta release of VxWorks AE, the advanced edition of Wind River's flagship real-time operating system.

Tom St. Dennis, Wind River's president and CEO, said the move emphasizes the com-



**The purchase reflects a move toward specialized niches, says Wind River's St. Dennis.**

pany's desire to seek niche markets. "Wind River is constantly striving to offer customers the highest level of specialized engineering talent," he said. "The engineers at Dragonfly are skilled in low-level hardware bring-up and know far more about the hardware tools and micro-

processor chips than most software specialists." He added that while Dragonfly has worked on a variety of microprocessors, its expertise on the MIPS architecture was of particular interest. ■

## iANYWHERE

◀ continued from page 1

other dedicated-line technologies, Veitch said, which are expensive and can require months to put into place. Such costs can discourage companies small and large from initiating even pilot projects, he said. "It is particularly difficult with some of the most common networks in use here in North America," such as those of Bell South, which Veitch said do not support IP protocols and therefore cannot leverage the Internet for data transport.

Of the other companies offering wireless gateways in the U.S., including AT&T (Wireless PocketNet), the Go America portal and Palm Inc. (Palm.net), none offer suitable services for industrial or B-to-B applications, according to Veitch. "You really want more than a WAP [Wireless Application Protocol] or HTML connection," he said. The others offer "microbrowser access only, with very limited data entry functionality," and lack the necessary speed and reliability for the "always-available iAnywhere architecture." For that, Veitch said, "you want to work at a message or IP level."

The iAnywhere service further differentiates itself, Veitch said, by being a one-stop shop. "With the wireless gateway and hosting, we offer something that nobody else offers: a single point of sales and support," that supports WAP, HDML (Handheld Device Markup Language), as well as protocols used by Palm.net and other networks.

Like its competitors, the iAnywhere ([www.sybase.com](http://www.sybase.com)) hosted service will provide a

gateway service with dedicated connections to carriers, Veitch said, but iAnywhere's gateways will use the Internet and VPNs to connect to the applications. "We're targeted at the developer and at enterprise pilot projects. The benefit we offer OEMs is that we provide a very easy path to [allow them] to extend their mobile applications." Programs may reside on the customer's server, or can be hosted by iAnywhere or by a third-party ASP.

The hosting service is the final cog in iAnywhere's cradle-to-grave solution for building and maintaining wireless networks to access enterprise databases. The iAnywhere mobile database solution consists of a development suite, wireless server and related server, and client components that permit clients to operate a database application independently of the server. Offline changes to the database use synchronization messaging to update and to be in touch with the enterprise whenever the client is in range.

Veitch said that the traditional markets for adopting new technologies—financial and medical sectors—also will embrace the emerging wireless personal technology. "What we see is that the next generation of banking applications will take advantage of the significant computing power that is going into small devices," including phones and handheld computers, he said. For example, iAnywhere has partnered with Ericsson to build a "mobile banking terminal," Veitch said, which will enable access to personal financial data any time, anywhere. ■

## 'THINKING' OVER PALM OS DATABASE

Writing a database application for handheld computers is now more than just wishful thinking. ThinkingBytes Technology Inc. has released a software development kit enabling third-party programmers to write database application plug-ins compatible with the company's ThinkDB relational database manager for the Palm operating system.

Programmers interested in creating database plug-ins for ThinkDB sign up at [www.thinkingbytes.com](http://www.thinkingbytes.com), and the company provides access to the ThinkDB program code with which to develop applications. Armando Neves, chief technology officer, said that the free plug-ins would give programmers an opportunity

to write internal Palm OS database applications that connect to external applications. "Programmer applications would access external programs for purposes of calculation, report printing and faxing, for example." He added that results from external programs would then be ported back into the internal applications and stored.

Once written, programmers submit the application for approval to the company.

If the company approves the plug-in, it will then certify the plug-in as compatible with the ThinkDB program, permitting the programmer to privately market the application. Neves said the company

would also aggressively market the plug-ins to vertical markets such as health care, education and services.

The company's newest version of ThinkDB, version 2.0, enables programmers to create and edit databases for handheld computers running the Palm operating system. Features include the ability to create as many as 100 databases containing 36 fields each; customizable views providing for resizing columns; and a forms designer for designing record entry forms. 2.0 adds synchronization to the database, enabling ThinkDB to synchronize with desktop database applications.

Pricing for 2.0 was not available. ■

**This little PDA went to market.**



**This one stayed home.**



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## EDITORIALS

## HP: The Software Company?

At the end of October, Hewlett-Packard Co. announced its purchase of Bluestone Software Inc. As HP continues to reinvent itself under the leadership of Carly Fiorina, the idea that the company would want to have its own application servers, e-commerce servers and even software infrastructure for mobile transaction processing is not unexpected.

Still, one must admit that HP's greatest successes haven't been in software, but in hardware. From test-and-measurement equipment to laser printers, from Intel-based servers to Unix-based minicomputers, the company has excelled largely because it didn't compete against software makers. With few exceptions, HP's software products have been minor players on the world stage. The company's only out-of-the-ballpark software success has been its OpenView management platform.

So now Hewlett-Packard is going into the application server business, hoping that its customers will see HP's Software and Solutions Organization as a preferred global business partner for J2EE/XML transaction services.

Will the acquisition of Bluestone move HP closer to its stated goal of being seen as a complete Internet services company, not just a hardware maker? Time alone will tell whether the acquisition of Bluestone, and the new business it brings, will offset the loss in revenue caused by the other app server makers' new view of HP as a direct competitor, rather than as a potential hardware deployment platform and services partner.

## Informix 2.0

As first reported two months ago, Informix Corp. is splitting into two companies: one focused on databases, the other on electronic business and Internet infrastructure software.

It's about time Informix did something. Its stock is trading at near a 52-week low of 3 3/4, down more than 80 percent from its high on April 7. It remains a member of the billion-dollar-market-cap club—but just barely.

Informix offers a bewildering array of current and legacy database technologies, some home-grown, others acquired. Unlike many companies in the enterprise software market, Informix continues maintaining and even improving its oldest products nearly indefinitely, which certainly makes its customers happy, but presents them with little reason to migrate to Informix's newer products.

The idea of separating database from e-business platforms is a good one. But the first thing its new database division did was unveil a new initiative, Project Arrowhead, designed to create a new product family that will combine a revamped Extended Parallel Server database, an application server licensed from an unnamed partner, a Web server and tools. Sounds like an e-business platform to us.

Various analyst projections show Informix back on the growth path for fiscal year 2001. If not...well, financially, Informix may be undervalued, and would make an attractive takeover target for not only its core database technologies such as Cloudscape, Foundation 2000 and Red Brick, but also its content-management and e-commerce applications. Hmm, maybe Carly Fiorina would want a well-known object-relational DBMS to go with her new Bluestone application server. ■

## GUEST VIEW

## THE FUTURE USER INTERFACE

The most salient feature of the future user interface will be its omnipresence. As embedded devices grow pervasive, and as the Internet is increasingly relied upon for daily tasks, the common abbreviation, UI, may soon be interpreted not as User Interface, but as Ubiquitous Interface.

Consider the role of the user interface in the humble chore of changing a washer. Lying under a sink, a plumber voice-inputs the serial number of a broken washer into the Electronic Performance Support System (EPSS) that is embedded in his uniform (the washer is an older one, so it doesn't have its identity electronically tagged). The EPSS automatically searches the Internet, and pages a plumbing-supply delivery truck that's nearest to the plumber. The driver, busily dodging heavy traffic, voice-inputs the plumber's needs to his EPSS, which checks the truck's inventory, and discovers that it lacks the appropriate washer. The driver calls the plumber and advises a substitute, and relays a holographic image of the recommended washer. The plumber uses a see-through visor to display augmented reality, so that he can confirm that the recommended substitute is a good fit. He informs the driver that the substitute washer is acceptable.

Since the user interface will be everywhere, consumers will place a high value on integration, intelligence and compatibility. Notice how the EPSS of both the driver and plumber are Internet-enabled. The better the integration, the greater the convenience. Rather than use his voice input, the driver would have preferred that the one EPSS relayed the plumber's needs directly to the other.

The preferences of a plumbing-supply truck driver may seem mundane while discussing the latest technological breakthroughs, but the desires of ordinary people will be significant in shaping the future user interface. No matter how much we admire the most recent advances, consumer choice determines what is actually utilized. The search for the Holy Grail of the "killer app"—an application that will lure the public into buying the latest innovation—illus-

trates the fundamental truth that technology serves people, not the other way around.

The convenience that consumers demand is illustrated by the use of voice input in the above scenario. Speech recognition is ideal for "hands-free" tasks, such as driving a truck.



ARIE  
MAZUR

Some analysts, excited by the intense interest in adding speech recognition to embedded devices, have predicted that typing will soon be as outdated as punching holes in a computer card.

The future utilization of different input methods has been illustrated by science fiction. Readers may remember the television drama in which the bold spaceship captain, desperate for a piece of information, strolled confidently to the command deck and uttered the magic word, "Computer!"

What we didn't notice was that, apart from the captain, everyone on the deck was typing.

A typical crowded office that instituted a user interface that was solely vocal would soon drown in a wave of deafening chatter. Workers involved in tech support, sales and mail orders would have difficulty simultaneously using a computer and a telephone. Even composing a simple memo could be embarrassing, because of the poor quality of early versions. Workers could wear earphones, but that would decrease normal interaction with both telephones and other employees.

Even portable appliances, which are a promising field for speech recognition, require more than vocal input. A task as routine as checking a bank balance while in a public place would be challenging because of the risk of revealing the user's secret access code. Not many would want to announce the date and time of their colon exam while standing in an elevator. Fewer would want to listen.

Developers understand that consumers prefer an intelligent, integrated user interface that provides the option of typed input. Examples of currently available "wearable keyboards" include the Chord keyboard and IBM's Half-QWERTY. Keyboards will not even be necessary for typing input. Consumers

may choose the option of typing input with motion-sensor rings, or touch-screens.

Hardware, however, is only one aspect of the user interface. The sophistication of the user interface is defined less by the choice of hardware than by the extent of its intelligence.

Predictive input is an example of how intelligent software can improve the convenience of current hardware. Predictive input employs sophisticated algorithms that apply linguistic data (including frequency) to accurately complete a word. A veterinarian types "h" and the word is automatically finished as "horse." Soon, word completion on the basis of context will be available. The entry "The American northern b..." will be accurately completed as "The American northern border" whether or not the word "border" has been used before.

Since predictive input requires fewer keypresses to input text, it is extremely practical for the awkward smaller keyboards found on some Net appliances. I am often approached by manufacturers who desire easier-to-use predictive fast input, which would attract more customers. No hardware changes are necessary to create a more convenient user interface. A small-footprint text-input-and-display layer can be added to any Net appliance (or Web-based app, for that matter) that will enable the user interface to accept predictive input. Consumers prefer to input text with as little work as possible—meaning that manufacturers who add predictive text input to their embedded devices will have a competitive edge.

While technology allows the user interface to be virtually everywhere, the high level of convenience demanded by consumers will necessitate a superb degree of compatibility and integration. Market forces will pressure Net appliance manufacturers, software developers and ASPs to upgrade the intelligence of current user interfaces. The implementation of intelligence to improve interaction for all input methods will be the hallmark of the future user interface. ■

*Arie Mazur is the founder and CEO of Slangsoft Inc. He can be reached at arie@slangsoft.com.*

## ALAN WATCH

## CATCHING THE M-COMMERCE WAVE

**W**ired is tired, say the pundits. Forget DSL, forget cable modems, forget broadband. Forget Netscape, forget Internet Explorer. Forget B-to-B, forget portals. The real action is in mobile electronic commerce. Move over, HTML; it's all about the Wireless Application Protocol, with XML acting as a core component of WAP.

Everyone's favorite example of m-commerce is of a young urban professional strolling around downtown Los Angeles on a hot summer afternoon. When he gets within a few blocks of a Baskin Robbins franchise, the phone beeps and offers a special deal, good for the next 15 minutes only, on a double-Dutch chocolate waffle cone—along with directions to the store.

Similarly, m-commerce promises to alert teenagers to the hottest new song by their favorite band. Teens can listen to samples right over the phone or on an MP3-equipped handheld; if they like what they hear, they can push one button to order the CD for next-day delivery.

Because mobile Internet devices are personal and pervasive, m-commerce sounds like heaven to marketers. Companies at all points in the wireless delivery value chain, from the retailers to software developers to replacement firms to service providers to handheld equipment manufacturers, are scrambling to catch the new wave.

Forrester Research says, "A third of all Europeans will use

the Net through mobile phones in 2004. Operators will try to control content and commerce services in the early years, but by the end of 2002 new mobile Internet providers (MIPs) will deliver open access to the Net for all." Another research group, Strategy Analytics, says that the m-commerce market could reach \$200 billion by 2004.

What's particularly exciting for many of these companies is that the m-commerce wave is potentially bigger than the browser-based e-commerce phenomenon. First, cell phones, two-way pagers and even handheld computers are less expensive than desktop or notebook computers—and there's talk about offering devices for free, as long as the end customer agrees to provide accurate demographic data and receive targeted advertisements. Second, when equipped with wireless Internet access, they're not dependent on fixed locations, such as homes, offices or schools. Those two factors, added together, mean that m-commerce might straddle both sides of the digital divide, providing access to the Information Superhighway for a wider array of consumers from a broader slice of the socioeconomic pie.

Many of the m-commerce opportunities, unlike today's full-featured browser-based Internet, really make sense for consumer retail sales and service offerings. When companies like

MapQuest.com Inc. figure out how to localize and repurpose their maps, driving directions, travel guides and traffic reports into a Nokia cell phone's screen—and can either convince consumers to pay for the maps or can devise an appropriate advertising scheme—m-commerce will really be cooking. (Only last week a subscriber asked us when SD Times will be available in a format suitable for downloading into a wireless Palm Connected Organizer. The answer: "Not yet.")



ALAN ZEICHICK

## TOOLING AROUND

As software development managers, our role in the m-commerce revolution will be analogous to our position in the creation of Web-based systems. This time around, however, I think that IT will be better prepared.

Many early corporate Web sites evolved out of guerrilla marketing departments or rogue sales departments—built and deployed using tools like Microsoft's FrontPage or Adobe's PageMill without assistance from information-technology professionals. That was fine when most Web sites were nothing more than brochureware, but over the past two or three years, the need for back-end integration, security and dynamic content taught business managers that Web development was software development. Fortunately, it appears that the tools of the m-commerce revolution will come from companies already familiar to software developers. For example, the Oct. 15 issue of

SD Times included an announcement from Java tools developer KL Group Inc. that it was renaming itself Sitraka Inc. and dividing into two separate divisions: one to focus on its traditional JClass and JProbe tools, the other to build applications for managing wireless applications. In the same issue, application server vendor GemStone Systems Inc., recently acquired by Brokat AG, disclosed that the future of the GemStone/J platform would be as a Java and XML-based server specifically targeting m-commerce applications.

That's not to say that m-commerce will be smooth sailing, because it's not clear how everything's going to work. With the wired Internet, most transactions were "pull," based on a browser's accessing a URL; "push" meant either a special client/server application running on a desktop or a target e-mail. With wireless electronic commerce, "push" will be more important—and may require intricate (and expensive) arrangements with wireless service providers and gateways, perhaps with specific terms and conditions for content types and formats. Marketers may be required to match their messages against consumer demographic profiles and stated preferences and even possible legislation regarding privacy. The demands of localization add to the challenges of implementing m-commerce.

Hmm, I think it's time for a snack. I wonder where the nearest Baskin Robbins is. ■

Alan Zeichick is editor-in-chief of SD Times.

## LETTERS TO THE EDITOR

## APIs DON'T TELL WHOLE STORY

In the Oct. 15 issue ("Will the Real-Time Linux Please Stand Up?," page 13), MontaVista CEO Jim Ready is quoted as saying a resource kernel module enhancement moves away from Linux standards. "TimeSys claims some very advanced scheduling and other proprietary enhancements to Linux which [require] their own proprietary APIs," which he said equate with a lack of portability. In response: It is true that the TimeSys enhancements (Resource Kernel) have their own proprietary APIs. However, you do not need to use our APIs in order to receive the

added features. The Resource Kernel allows you to dynamically assign CPU/Network reservations to any Linux application (binary) as is. We also 100 percent maintain application/driver portability on our distribution. The resource kernel is also designed as a loadable kernel module which can be "plugged" into any distribution. We and MontaVista modify the underlying kernel to add kernel pre-emption and other enhancements (RT-scheduling), which we hope will be adopted by the Linux community.

David Tannenbaum  
Director of Marketing  
TimeSys Corp.

## VIEW OF HELP NEEDS HELP

In the story "Help Is on the Way From ForeFront" (Oct. 1, page 7), I want to [clear up] a misconception that [ForeFront Inc. president] David Granger has.

While the RoboHelp authoring environment runs on a Windows platform, our WebHelp is an HTML-based Help format that is cross-platform and browser-based. Unlike WinHelp and Microsoft HTML Help, it can be deployed on non-Windows operating systems including Unix, Macintosh, Linux and Solaris.

In addition, RoboHelp Office 9.0 provides the flexibility to combine its Help development features with the capabilities of any other popular HTML editor (such as FrontPage, Dreamweaver, HomeSite and many

more). This gives RoboHelp users the best of all worlds, and turns any HTML editor into a powerful Help development tool. RoboHelp supports all major online Help formats including WinHelp, Microsoft HTML Help, WebHelp, JavaHelp, Oracle Help for Java and more.

## Stephanie Huff

Public Relations Associate  
eHelp Corp.

## CORRECTION

The XML DevCon event, held in New York in June, had 4,800 attendees, including both paid conference delegates and those admitted free to the exhibits only. The number of paid attendees was incorrect in an article in the Aug. 1 issue ("XML DevCon a Hit in New York" page 1).

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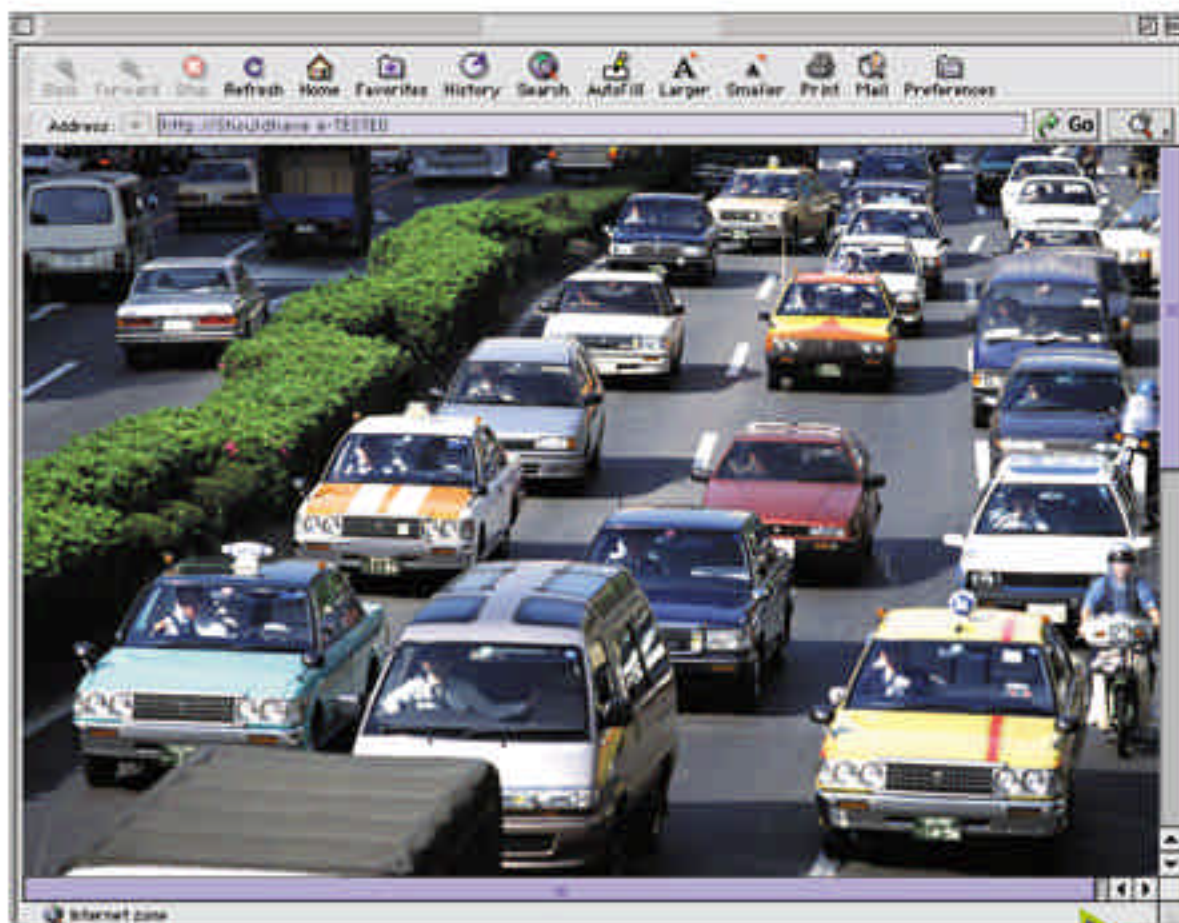
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# Are You Covered?

Code coverage is a commonly overlooked test procedure, and one that can easily get software managers—and their companies—in hot water

BY EDWARD J. CORREIA



If you think your software is being thoroughly tested, you may be in for a surprise.

A recent study published by International Data Corp. found that nearly 75 percent of companies conducting business on the Web with revenues in excess of \$200 million have suffered Web site failure within the past six months, mainly due to software bugs and complications relating to software upgrades. Some may recall the headline-grabbing site failures of Charles Schwab & Co. Inc., eBay Inc. and E-Trade Securities Inc., all of which were attributable to software problems. And NASA's Mars probe disaster tells a dire tale of the need for extensive code coverage testing.

But according to Richard Bender, senior vice president of Caliber-RBT product management at Technology Builders Inc. (TBI), the problem is not limited to commerce Web sites and space flight. Bender said that during the more than 200 software audits his company has conducted, only about 30 percent to 40 percent of the code, on average, was actually tested prior to release.

When explaining the need to use QA tools as an integral part of any testing strategy, Bender said he often finds informational voids in the corporate culture. "When I ask executives what they have done to handle the quality of what they're producing, most of the time I get blank stares," Bender said. TBI (www.tbi.com) develops and markets Caliber-RBT, a requirements-based testing tool that includes a functional code coverage module. "We have to educate senior management on quality issues, because they're still viewing this as a techie issue and not a bottom-line business issue," he said.

Zohar Gilad, vice president of product marketing at Mercury Interactive Corp., agrees. "Testing is a CEO problem," he said. "If your mission-critical Web site has poor performance or func-

tional errors, your customers are going to shop elsewhere. So it's not a developer problem anymore. It has become a much bigger issue because of the importance associated with it."

Mercury (www.mercuryinteractive.com) develops Web performance analysis and management tools, which it also markets as a critical element in designing a testing plan. Gilad said that although load testing has a long way to go before it is fully accepted throughout the industry, "testing has become a staple in e-business jobs worldwide. Testing is not a luxury anymore; it is a must. If your products are not reliable and performing well, your revenue is going to be hurting."

Still, society has come to expect problems with software. "If we had the same kind of defect rate in a car, an airplane or a copier, those companies would be out of business in a hot minute. But we seem to accept this in software," Bender said, adding that internal users seem more willing to put up with poor performance, but an Internet customer will not.

## DON'T RELEASE UNTESTED CODE

Bender warned that voids in quality assurance often can have dire consequences; software litigation is more widespread than most people realize. "Any time I talk to counsel at a large software company, all of them—100 percent—are involved in software litigation continuously."



**Software litigation is more common than most people realize, says TBI's Bender.**

Bender is frequently called upon by the legal departments of companies to be an expert trial witness, and has testified in a number of cases, always for the prosecution. The majority of software litigation, he said, centers around breach of contract. In every case in which Bender has testified, code coverage tools were used to reveal how much of a program's code was actually tested. And in every case, it was proved that "the software supplier did not reach any level of due diligence in the testing

of the product before they delivered it," making it unfit for use, and thereby voiding usage contracts.

Part of the problem, Bender said, is a lack of standards of quality. "We don't have the standards in the software industry that they have in, say, the medical, engineering or accounting professions, where you can get sued for malpractice." In those industries, there are clearly defined rules about what constitutes malpractice, Bender said.

The problem continues to mushroom, according to Sam Guckenheimer, Rational Software Corp.'s senior director of technology for automated testing, because many developers lack incentive to write good code. "Developers usually get measured in lines of code or something similar, so the time they spend on testing their code before delivery doesn't really get counted. And the quality, or lack of quality, of code they deliver tends not to get measured," he said.

The findings of TBI's software audits bear that out. "Whether you're talking embedded or supercomputer or anything in between, at the end of all our testing we found a defect rate of roughly five defects per 1,000 lines of executable code. And for client/server apps

the number is about 7.2," Bender said, a defect rate that he considers high.

"Right now, everyone's worrying about shorter time-to-market because of the Internet time pressure," said Guckenheimer. "We're all trying to grapple with what we call the new software paradox, which is the need to produce higher quality in much shorter cycle times because of the expectations that the Web has brought."

As a result, Guckenheimer continued, testing can sometimes take a back seat. "The classic [scenario] is that testing gets squeezed in at the end and cut short, and you have these horrible, bitter project meetings where the testers say, 'We need more time; it's not ready,' and management says, 'Too late; we're going to ship anyway.' So you get the kind of headline failures that you read about."

Rational (www.rational.com) offers an extensive array of development automation and testing tools to address these problems, one of which is PureCoverage for Visual C++, Visual Basic and Java developers, a code coverage tool that is part of its TestStudio Suite.

Cleanscape Software International, which also markets development automa-

► continued on page 28



**Many developers lack incentive to write good code, says Rational's Guckenheimer.**

## Hosted Apps Lend Helping Hand

Developer shortage spurs growth of outsourced services

BY EDWARD J. CORREIA

It's hard to find good people. That's particularly true in the software development market, where it's nearly impossible to find good developers, let alone use them to also do application testing.

According to Tanya Osadchuk, senior technical consultant at search firm Witthauer Associates Ltd. (www.witthauerassoc.com), there are far more programming jobs open than

there are qualified people to fill them. "An abundance of candidates are being passed up because they don't have the three-plus years of experience that most companies want," Osadchuk, who specializes in placing Java developers, said that some of her clients have resorted to outsourcing.

Testing-tools vendor Mercury Inter-

► continued on page 27



# Software Implementation a Risky Business

## Cigital offers risk-management strategies from the perspective of business

**BY DAVID RUBINSTEIN**

Software confidence for the digital age. That's Cigital Inc.'s mantra.

Formerly known as Reliable Software Technologies Inc., Cigital appeared as its new name in September, heralding the company's attempt to position itself as a leading authority on software risk management and the impact software failures can have on businesses.

Cigital CEO Jeffery Payne sees four main issues in assessing the impact of software failure: brand, revenue, liability and productivity. Using the example of the Ford Motor Co., Payne said that even though Ford is not in the tire business, its brand was hurt when serious problems with Firestone tires arose. Similarly, a manufacturing company could be hurt because a piece of software it depended upon failed. Software failures also can result in lost revenue, he said, citing Hershey Foods, which claimed to have lost money as a result of an incomplete software project causing the inability to ship candy in time for Halloween 1999.

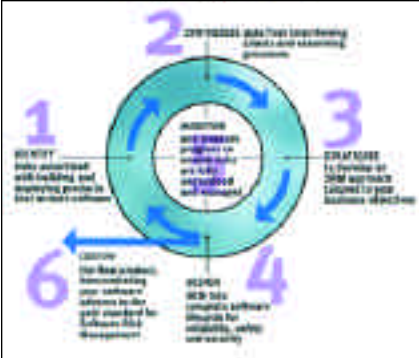
The issue of liability is a relatively new one, Payne said, as companies try to hold software vendors responsible for lost business due to software failure. The

trend for this began as companies sought out Y2K-related bugs within their organizations. He spoke of a recent case in which FoxMeyer Drug Co., a drug distributor, is suing Andersen Consulting and SAP for \$500 million each for what it claims was a costly, error-filled installation of an SAP integration system. Finally, there is the lost productivity of workers unable to do their jobs because back-end systems fail, or Web applications do not work and employees cannot do what they are paid to do.

"Software is a business issue, not a technical issue," Payne said. "Software is the lifeblood of a business. It must work."

To that end, Cigital is packaging and branding a service incorporating its expertise in risk assessment with proprietary technologies. Called Cigital Advantage, it is intended to identify risks and implement risk mitigation from the very beginning of the development cycle, straddling the gap between business managers and the technical staff.

"We want to be involved from day one," Payne said. As part of the design team in the development cycle, Cigital represents the business during software architectural planning. It assesses and



**Cigital Advantage identifies and mitigates risks throughout the development lifecycle.**

measures every artifact produced, providing code review, design review and security assessment as well as configuration management, bug tracking, QA and coverage analysis, Payne said. "The key is that all of that is done and based on risks to the business," he said. "Some businesses decide the risk is so large and costly, and will exceed the deadline and budget, that they roll the dice and take the risk. But it is a business decision. Businesses take risks all the time."

A key to Cigital Advantage is certification, he said. "We believe it is time for software producers to step up to the

plate and certify what their software can or cannot do," Payne said. Cigital is offering to certify, after inspections by its auditors, that software products are reliable, secure and safe, and will mark the products as such, he said. The plan is backed by insurance for Cigital and business-loss insurance for the end users, he explained.

"Software development is an immature science," Payne said. "When architecture was 50 years old, buildings were collapsing, or propped up with large poles. It's just that software has gotten to that critical point much faster than the other sciences, in that if it fails, it can cost businesses everything."

Payne said Cigital ([www.cigital.com](http://www.cigital.com)) is targeting large, global companies with the most to lose if software fails. "A lot of big companies, whose software isn't their core business, can use our help. They need someone on their side to help the business person make sure what's being done with the software is in the best interest of their business." Pricing for the service varies depending upon the size and scope of the project, but starts at about \$150,000, according to Jen Norman, director of marketing for Cigital. ■

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## HOSTED APPS

◀ continued from page 25

months capitalizing on the outsourcing trend. Zohar Gilad, Mercury's vice president of product marketing, said that "one of the key issues today is the shortage of IT personnel, and I don't see this trend going away." In January, the company (www.mercuryinteractive.com) launched its first hosted load-testing service.



**Many companies don't have the budget, time or people for testing, says Mercury's Gilad.**

"The notion is to permit customers to choose not only to implement the product in-house, but also to outsource it either through our hosted service or a third party." The company also plans to offer its Test Director QA management tools as a hosted application. "Many companies don't have the budget, time or personnel to go for product deployment implementation," Gilad continued. "And many companies remember that they need to test at the last minute. So even if they had the money, machines, infrastructure and personnel, it's not going to do you any good because it takes time. If you go for a hosted service, we can deliver it within 24 hours."

Even existing Mercury customers, Gilad said, can benefit from hosted services when they need to "complement what they already have for a particular event. And any of our customers can switch between a product and a hosted service at any time because they own the scripts, and they can start with a hosted service and continue to a user product or vice versa."

Also joining the trend of hosting applications is RSW Software Inc. (www.rswsoftware.com), which recently released e-Load Expert, a hosted load-testing service that the company says can analyze a Web site's functionality and performance to determine its production readiness and identify application bottlenecks. Steve Caplow, RSW's director of marketing and business development, said that companies "either lack the people or expertise, lack the infrastructure—the hardware or software—or they don't have the time necessary to do load testing."

But Caplow's view on testing differed from Gilad's. "We believe that testing is a process, not an event. It is ultimately something that people need to do on a routine basis, because applications need to be tuned for optimal performance. It's not something you can just test at the end, say it's OK and move on." Web site applications do not have to be fully developed in order to be load tested, Caplow said, but instead, need only be minimally functional and accessible through a browser.

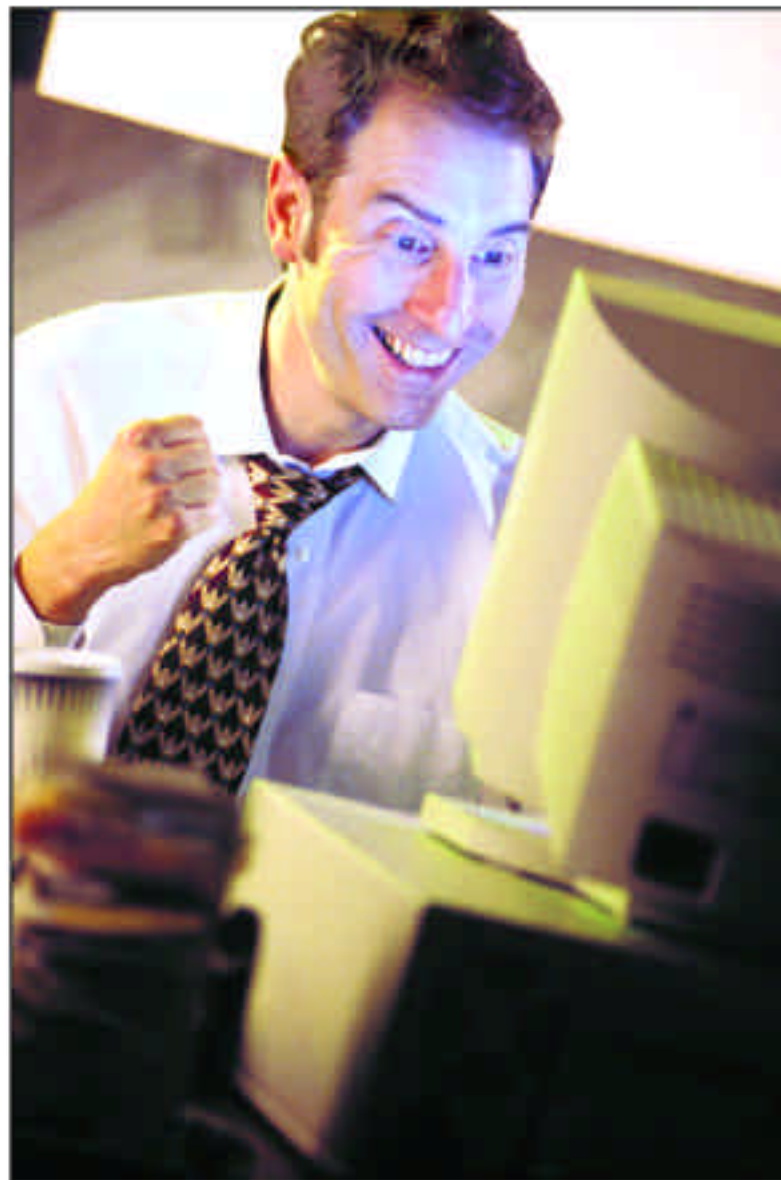
Caplow claims that the biggest difference between RSW's services and Mercury's hosted load testing is ease of use. "We've made it really easy and quick for people to do their own automated testing, where the Mercury tools tend to require significant amounts of scripting and expertise. Our product uses a mostly visual approach and does not require writing

a program. And what we're finding is that the people who are tasked with doing QA are not necessarily computer scientists, and the amount of time to do the test is short. Also, changes to the applications are frequent, and it's very difficult for people using Mercury tools to keep up," Caplow said.

"I am quite surprised that RSW chose to slam the hosted load-testing

service with ease of use," countered Gilad. "In a hosted-service context, scripting ease of use is irrelevant to customers, since the work is done entirely by the hosted-service experts."

But like Mercury's services, scripts developed by RSW through the service belong to the customer and can later be reused for conducting their own internal tests, Caplow said. ■



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## COVERAGE

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tion tools, was divided on the issue of testing priority. Brent Duncan, Cleanscape's director of marketing, is an advocate of keeping testers and developers apart. "I firmly believe that if you have the manpower, your testing has to be separated from your engineering depart-

ment," he said, "because engineers feel like once they've created the code, they're done. A software QA department is needed to make sure that software is adhering to requirements and is being tested thoroughly."

But Ted Batha, Cleanscape's president and CEO, took an opposing view. "I don't agree with Brent. The implementation of testing is a technical issue. Engineering

has always been the glamour child of any software organization. Because of the investment requirements, testing doesn't always get the proper recognition in organizations that it should; it just needs to get more visibility."

But Duncan was adamant. "Buggy software is really a management issue. The CEO's job is to have a vision, to make a plan and to create an environment and

an infrastructure by which that plan can come about. And what we try to do with our software is to make sure that management can see the value of doing the testing process early." Cleanscape (www.cleanscape.net) offers a code coverage module in its ATTOL software test automation tool.



**Testing should be separated from development, says Cleanscape's Duncan.**

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### CLEARLY DEFINE QUALITY

A surprising fact that emerges from cases in which TBI's Bender has testified is a "stunning lack of or ambiguous mention" of software quality issues in vendors' software use contracts, Bender said. "Almost invariably these contracts are either silent on the quality issue or they have ambiguous phrases like 'the vendor shall thoroughly test the software before delivering the software to the client.'"

Bender said that what compounds the problem in the private sector is that the parties don't agree up front on what the quality criteria are, and he characterized government quality standards for software that it buys, which include those for FAA-certification and other mission-critical applications, as weak.

One thing seems clear. Most will agree that code coverage is the one vital element in any testing strategy. Mike Connor, director of solutions management at Compuware Corp., characterized coverage tools as absolutely critical. "Code coverage is the only set of tools that can turn the 'black box' into a 'white box,'" he said. "They let you see inside and determine, from a quality perspective, if your testing is complete."

"It's all about managing the risk of going to market with applications," said Jay Holmstrom, director of product management for QA Center, Compuware's quality-assurance suite that includes a code coverage module. Holmstrom said that testing definitely needs to be a CEO issue.

Holmstrom said that although Compuware (www.compuware.com) provides tools to help its customers manage risks, there is a limit to how much of the liability Compuware is willing to take on. "It's ultimately the customer's responsibility as to how rigorously they use those tests and how well they follow what we propose as a good testing process," he said.

If in the end due diligence in testing will ultimately pay off, why are so many companies hesitant to use coverage tools? "Because they give you bad news," said TBI's Bender. But in all the cases in which he has served, he said it would have been far cheaper for the software companies to perform more extensive testing than to defend themselves in court. ■



**Still a techie issue, testing just needs more visibility, says Cleanscape's Batha.**



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## News Briefs

## MORE PRODUCTS

&lt; continued from page 7

implemented, NQL Java Edition is in the process of being readied for the Macintosh and Sun operating systems as well. The beta version is available at [www.nqli.com](http://www.nqli.com) . . . Attunity Ltd. (formerly ISG International Software) has added major new features to its **Attunity Connect 3.0** enterprise integration software, including front- and back-end XML connectivity, Java support, thin-client architecture, virtual database technology and extended support for AS/400 and S/390 mainframe platforms. Starting price for Connect 3.0 on a Windows NT relational database is \$2,500, and for mainframes is \$180,000 . . . Wind River Systems Inc. has unveiled the **OSEKWorks** RTOS embedded product line for the automotive industry that provides software for automotive control systems for anti-locking brakes and engine and traction control. In addition, Wind River's Tornado integrated development environment can be integrated with OSEKWorks to help programmers reduce development times and speed production times . . . Reasoning Inc. has released a book titled **"Building Great Software"** that outlines common mistakes and best practices in writing business-critical applications in C and C++. The book examines five primary causes of fatal errors in C and C++, discusses the impact of each error and offers advice on how the error can be repaired. Copies are free at [www.reasoning.com](http://www.reasoning.com) . . . GemStone Systems Inc., a Brokat company, has released the **GemStone/J 4.1** J2EE application server, which the company is targeting at mobile applications. The server supports Entrust Technology's Entrust PKI 5.0 security software for encryption, digital signatures and key and certifiable management; and can run multiple application instances simultaneously. Prices start at \$4,995 . . . CodeMesh Inc.



has begun beta testing its **Junc++ion** code translator on AIX, HP-UX, Linux and Solaris. The beta release is expected to be available

late this year . . . WebGain Inc. has made available a plug-in that integrates **VisualCaf 4 Enterprise Edition** and the **WebGain Studio** development environment with the **iPlanet Application Server** runtime environment, creating what the companies call a fully integrated development and deployment environment based on the J2EE specification. The plug-in is available for free download from both companies' Web sites . . . The latest version of **KDE 2.0** desktop for Linux is available for download from SuSE Inc. Visit [ftp.suse.com/pub/suse](http://ftp.suse.com/pub/suse) to download KDE 2.0 . . . AbriaSoft Co. has ported the **Abria SQL Standard Suite** open-source database to Windows NT/2000. The \$99 suite includes MySQL for Windows and can be downloaded from [www.abria.com](http://www.abria.com) . . . Lead Technologies Inc. has released a **PDF Plug-In** that allows for loading, saving, viewing, rasterizing and encoding files in PDF, PostScript and EPS formats. The plug-in is available as an add-on to the LeadTools Document and Medical lines of imaging development toolkits, and can be downloaded from [www.leadtools.com/PDF.htm](http://www.leadtools.com/PDF.htm).



## PEOPLE

Linux-based embedded systems vendor Lineo Inc. has named **Richard Larsen** senior vice president of worldwide sales operations. Most recently, Larsen was sales director at Sun Microsystems Inc. Also, **John Mezinko** has been named vice president of Americas sales, and **Paul Ray** has been named director of worldwide product sales . . . PeopleSoft Inc., which recently announced record third-quarter revenues, has promoted chief financial officer **Steve Hill** to senior vice president of business development. **Kevin T. Parker** joins PeopleSoft as senior vice president of finance and CFO, and **Renee L. Lorton** becomes vice president and general manager of PeopleSoft's financial products . . . Mortice Kern Systems Inc. has reappointed **Alex White** to the MKS board of directors while accepting the resignation of **Anthony Hull** as the board's director. White is chief architect at Vertical Sky Inc. Hull left to spend more time as head of finance, accounting and tax for DreamWorks SKG. . . **David Wenk** has been named chief marketing officer of Zucotto Wireless Inc., where he will be responsible for creating and directing the company's business strategies and managing the global marketing organization. He reports to president and CEO **Gary Wells**. ■

# Wireless DevCon 2000 Takes Aim At Shift to Wireless Applications

## Vendors look to be among the early movers and shakers

BY DOUGLAS FINLAY

Killer applications of the future certainly have wireless written all over them, as companies such as BEA Systems Inc. and Tibco Software Inc. have signed agreements with Nokia to access its wireless server to secure applications for handheld devices, and Microsoft Corp.'s future .NET strategies include wireless applications.

## FIRST OF ITS KIND

So it seems fitting that the first-of-its-kind Wireless DevCon 2000, scheduled for Dec. 3 to Dec. 5 at the Doubletree Hotel in San Jose, Calif., is taking clear aim at up-and-coming vendors and programmers looking to be the movers and shakers of the nascent wireless industry now burgeoning on the scene.

"Wireless is the next big wave," said Camelot Communications president Terry DiGuili, whose company is a co-sponsor of the conference, along with SYS-CON Media Inc. She said that because wireless will affect and transform how people communicate and conduct business in the future, "developers and managers who are building these emerging applications need to be informed and armed with tools and options today so they can build what will become commonplace in the not-too-distance future." She said a forum of this nature had become essential "if we are to deploy wireless in a real-world environment."

At press time, 45 companies had planned to exhibit products. Wireless handheld devices for every business need are expected to be on display for presentation to programmers, system engineers, software architects, Web developers, project managers and leaders, consultants and educators.

The vendor list includes, but is not limited to, Air2Web Inc., AlterEgo Networks Inc., @hand Corp., Broadvision Inc./Interleaf, Buzzeo Inc., Extended Systems Inc., FusionOne Inc., MobileWebSurf.com, Motient Corp., PointBase Inc., Rogue



Wave Software Inc., RSA Security Inc., Seagull Technology Inc., Sun Microsystems Inc. and the WAP Forum. "The delegates and vendors who attend are on the leading edge of defining what the wireless picture will look like," DiGuili said. She said 1,500 attendees were expected to attend.

## TECHNICAL PROGRAMS

Some nine hours of technical instruction will be offered starting Sunday, the opening day of the conference. Sessions will include "Introduction to WAP Development Using WML and WML Script," "Java Technologies for Mobile Devices and Services," "Wireless Development Using the Microsoft

.NET Framework," and "Wireless Streaming: Real Time Content Goes Mobile." A night session will be offered from 6:00 p.m. to 7:30 p.m.

Technical instruction will increase to 15 hours on both Monday and Tuesday, adding tracks such as Technical, Portal and User Interface, and General and Managerial on Monday; and Technical, Wireless and the Enterprise, and General and Managerial on Tuesday.

Among Monday's 15 sessions are "Real-Time WAP-Enabled Device Customization," "Handheld Devices: User Interface Issues Conquered," "Enabling the Wireless Enterprise With SOAP," "Adaptive Frameworks for the Integration of Wireless Clients with Enterprise JavaBeans-Based Back Ends," "Advanced Techniques for WML Programmers" and a panel featuring Mark Sears and Timothy A. Reilly on "Bluetooth and Wireless Networking." A night session will be offered from 6:30 p.m. to 8:00 p.m.

Tuesday's 15 sessions will include "Architecting a Content Delivery System Using Java, XML and WAP," "Wireless Application Development With Open Source," "J2ME Profiles and Configurations," "Mobile Commerce: Emerging Business Models," and "Scalable and Global Wireless Applications."

Three keynote sessions will be given Monday, and two keynote sessions will be given Tuesday. ■

## WIRELESS DEVCON 2000

[www.wirelessdevcon2000.com](http://www.wirelessdevcon2000.com)

## CONFERENCE:

Dec. 3-5, 2000  
Doubletree Hotel,  
San Jose, Calif.

## CONFERENCE HOURS:

**Sunday:** Registration,  
9:00 a.m.-6:30 p.m.  
  
Preconference Tutorials,  
10:00 a.m.-1:00 p.m.;  
2:00 p.m.-5:00 p.m.  
  
Night School:  
6:00 p.m.-7:30 p.m.

**Monday:** Registration,

7:30 a.m.-6:30 p.m.  
  
Sessions, 9:00 a.m.-11:00 a.m.;  
1:30 p.m.-4:30 p.m.  
  
Welcome Reception,  
5:30 p.m.-6:30 p.m.  
  
Night School,  
6:30 p.m.-8:00 p.m.

**Tuesday:** Registration,

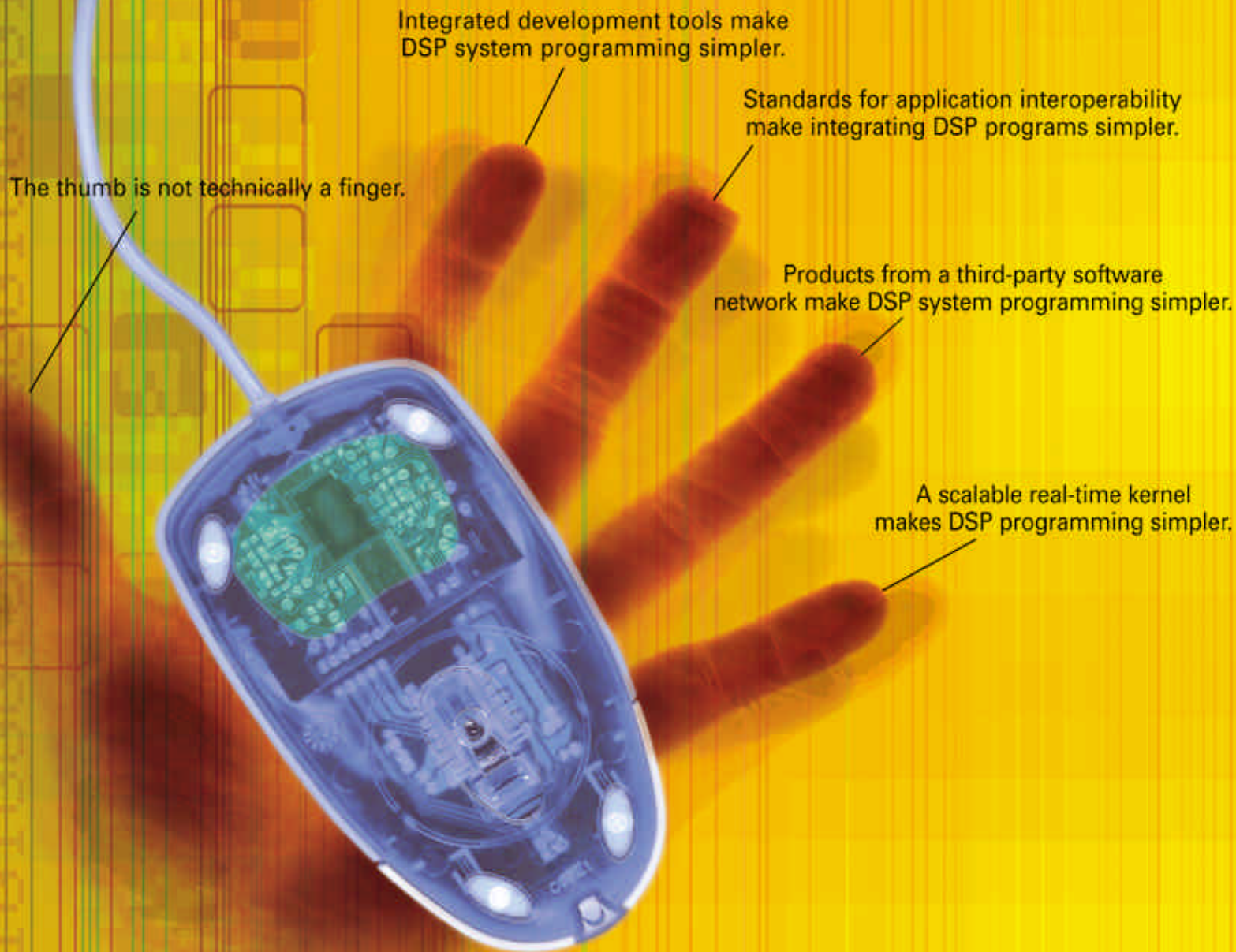
8:00 a.m.-6:00 p.m.  
  
Sessions, 9:00 a.m.-11:00 a.m.;  
1:00 p.m.-5:30 p.m.

**EXHIBIT HOURS:**

Monday, Noon-6:30 p.m.  
Tuesday, Noon-6:00 p.m.

**KEYNOTE SESSIONS:**

**Monday:** Keynote I,  
8:15 a.m.-9:00 a.m.  
Keynote II, 11:15 a.m.-Noon  
Keynote III, 4:45 p.m.-5:30 p.m.  
  
**Tuesday:** Keynote IV,  
11:15 a.m.-Noon, Wireless  
Editorial Panel  
Keynote V, 3:15 p.m.-4:15 p.m.



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## EXCHANGE SERVER 2000: PROMISE VS. REALITY

Once again, the Microsoft product roll-out litany begins, this time with Exchange Server 2000—and bear with me because this does affect your developers. First we have an enticing new features brochure: Microsoft has added advanced server clustering, no database size limitations as well as the ability to run multiple databases on a single server, tight user and server management integration via Active Directory and Microsoft Management Console (MMC), internal support for things like instant messaging, and videoconferencing. Most important to developers, especially internal intranet developers and those looking to build team-oriented development environments, is the new Web Storage System.

Sounds great, right? But after years of experience in dealing with this pattern, I've learned to put the brochure down, check out the physical product and wait for the other shoe to drop. Sure enough, we hear a resounding "thump."

After all the hassle and agony of actually getting Exchange Server 5.5 working semi-reliably, many network managers were hoping that Exchange 2000 would be easier and more stable. We couldn't be more wrong. Microsoft's main focus here seems to be to bind both network admins and internal corporate developers that much closer to its Windows 2000 Server

platform, primarily by implementing Exchange 2000 Server so that it's pretty much useless without Active Directory—which is found only in Windows 2000 Server. On paper, this feature set reads fine, but since neither Exchange 2000 nor (more vexingly!) Active Directory is currently working properly, this combination just hogs up massive amounts of server disk and CPU resources without doing a whole lot. I can get better basic e-mail performance by using Eudora.

But let's fast forward four months from now and pretend Redmond has finally released Exchange Server 2000 Service Pack 1 along with the Windows 2000 Service Pack 2 for Active Directory. And let's optimistically assume that these fixes make the platform usable. What's interesting to software developers here? The Web Storage System, that's what.

This is Microsoft's latest sniper bullet aimed especially at those pesky groupware competitors that just refuse to go away, notably Lotus Notes and less notably Novell GroupWise. The Web Storage System (WSS) is an event-driven development tool that allows intranet developers to build applications based on the Exchange 2000 document repository. In a nutshell, WSS allows Exchange to

employ fairly sophisticated rules-based work-flow processing in combination with messaging, data validation, versioning indexing and search capabilities. If this sounds like it's oriented to document management and knowledge-base applications, that's because it is.

Frankly, I was looking for something exactly like this recently for one of my own projects, and couldn't find it. The fact that Redmond has "released" it and I still

can't use it does little to alleviate my mood. I was looking for a knowledge-base application that was easily built, easily customized and didn't require a separate internal expert to administer. This basically boils down to a directory-based document repository, the ability to secure this directory, control document check-out/check-in, and a simple intranet-based front-end searching, submission and indexing tool. Try finding something like this from third-party vendors. Not easy. Most knowledge-base tools today seek to deliver everything up to and including the kitchen sink, which makes them highly complex to configure and administer as well as requiring proprietary database-driven repositories and other access tools.

Exchange 2000's WSS has the potential to do away with this complexity—mainly because it tries to leverage software engines you should already have

running as an Exchange and Windows 2000 user. That means that access and versioning run off of Active Directory, while the document message store is controlled by the same engine that handles the e-mail database for Exchange. WSS really just boils down to new rules and GUIs you can assign to these engines bolstered by support for new protocols and development standards, especially HTTP and XML.

By combining these technologies, WSS lets intranet developers leverage the Windows 2000 file system as the document repository, Active Directory as the control mechanism, Exchange Server 2000 as the collaboration server and the Web as the collaboration medium. Unfortunately, because it's Microsoft, you'll also wind up getting steered toward COM and ASP via the Exchange 2000 SDK as well as OLE DB and ActiveX Data Objects. But then again, if you've taken the Windows 2000 commitment cliff dive, that probably won't matter much internally. Serving up such applications to clients outside the intranet, however, could well become tedious.

But one migraine at a time. Hey, Microsoft: Get the underlying server technologies working first, and I'll be happy for the short term. ■

*Oliver Rist is vice president of product development for rCASH in the REALM. You can reach him at [orist@therealm.com](mailto:orist@therealm.com).*

### WINDOWS WATCH



OLIVER RIST



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## HIRING CRISIS! FILM AT 11!

When I saw the headlines about congressional testimony that blamed the IT personnel shortage on bad management, I thought I had an easy story to write. You know, some kind of "Technology management is poor. In other news, Congress expects the sun to rise in the East tomorrow" sarcasm about career politicians pontificating about an industry they know nothing about. Unfortunately, the more I investigated, the more I found myself nodding in agreement.

Let's clarify a couple of things: First, Congress's interest in the subject is solely because of a then-pending measure, now approved and signed into law, to increase the number of active H-1B visas.

The H-1B provision allowed approximately 20,000 guest workers per year in the 1970s, but there has been a huge increase in the past few years—65,000 visas were issued in 1998, 115,000 this year and last, and 195,000 additional ones are to be issued each year for the next three years. The H-1B visa is good for three years with a three-year possible extension, so it's difficult to know what the population of guest workers will be, but in any case, well over half a million. Forty-seven percent of those who receive H-1B visas are programmers or systems analysts.

Second, hiring is frustrating. The aver-

age time to fill a tech position in Silicon Valley is 3½ months. If you've been hiring lately, you know that screening resumes is ineffective, bozos with laughable talent can bluff their way through a phone interview with a nontechnical recruiter, and anyone with solid talent and communication skills who gets interviewed is likely to be offered multiple jobs within two weeks of job searching. On the face of it, there is an undeniable need for all the qualified candidates we can get.

But let's review some other, less obvious, truths.

First, H-1B visa holders are underpaid relative to the market. The use of H-1B workers as cheap labor is so fundamental to hiring practices, at least in the Bay Area, I was surprised to learn that the law requires them to be paid a "prevailing wage." That's laughable, at least in relation to their resumes: Last year I managed a Chinese Ph.D programmer who was paid less than \$40,000 per year. There are several reasons for the pay disparity—not all sinister. For one thing, either collegiate standards in Asia aren't what they are in the U.S. or people are coming in with grossly padded resumes. I fired that Chinese Ph.D when she proved incapable of anything beyond entry-level QA work.

### WEB WATCH



LARRY O'BRIEN

I think it's also fair to say that many talented and accredited guest workers don't have the English communication skills and cultural insight to successfully move into higher-paying leadership positions. Most important, though, guest workers aren't fluid in the marketplace—it's difficult for them to "jump ship" for the company that most highly values their talents. Whatever the market forces at play, the result is that there is an increasing number of "body shops" that provide cheaper programming talent based on H-1B guest workers, while analysis and design are left to much-higher-paid permanent employees or consultants.

Also relevant to the hiring debate are two other uncomfortable facts: ageism and attrition. These are entwined—I doubt that a 50-year-old programmer who's been coding Java for three years is going to go begging, but the industry is tremendously unforgiving to those who are not current on the latest technology. Once your software knowledge is out of date, you have almost no chance of getting through the naïve Boolean check-offs of the resume and phone screens to prove your actual talent.

Norman Matloff's "Debunking the Myth of a Desperate Software Labor Shortage" (<http://heather.cs.ucdavis.edu/itaa.real.html>) lays out these arguments in detail and concludes that a more effi-

cient hiring process would radically alter the economics of technical hiring. In the end, I found myself agreeing. There is no standard resume interchange format, job site search tools are geared toward simple Boolean queries, there is no standard body of software engineering knowledge, there are few screening tools for general programming aptitude, and there is no standard, de facto or otherwise, that communicates one's technical talent. For years I've advocated that the software engineering community promote the expectation that candidates provide portfolios, as is expected from other creative types.

In my last column, I argued that economics dictates that talented engineers will increasingly become free-lance consultants as the carrying costs of in-house engineering staff grow untenable. That argument holds even if, miraculously, the technical community develops efficient hiring practices; anything that improves accuracy in evaluating external resources such as job candidates will benefit independent consultants even more. Talented software engineers will remain a scarce commodity. In other news, the sun *will* rise in the East tomorrow. ■

*Larry O'Brien, the founding editor of Software Development Magazine, is a software engineering consultant based in San Francisco. He can be reached at [lobrien@email.com](mailto:lobrien@email.com).*

## CLEAN DATA IS HAPPY DATA

Your enterprise's data resources are considered to be among its most important assets. But if the data isn't clean, if schemas are confused, if definitions aren't consistent, if data structures aren't oriented toward your line of business, and if the resources aren't available to the right people at the right time, then you're in trouble. Reports and query results will be inaccurate, as will be decisions based on unreliable information. Employees will avoid using data resources that their employers have spent hundreds of thousands or even millions of dollars constructing—and might choose to develop alternative resources, which will only exacerbate the problem.

So, if the information's going to be useful, the data needs to be clean and properly organized. But what does "clean" mean? According to Michael H. Brackett in "Data Resource Quality: Turning Bad Habits into Good Practices," clean data means more than double-checking to ensure that a social security number has nine digits, or that the ZIP code a customer provides actually matches the customer's city and state. It's also imperative to ensure data resource quality at many levels, from creating strict naming conventions used for database tables, to documenting data integrity rules and dependencies, to making sure

that data resources are designed with a business perspective foremost.

Brackett has turned his four decades of experience in data processing into a set of blueprints for recognizing problems with data. This book doesn't have all the answers; it's not a guide to creating an ideal enterprise data resource, or for re-engineering a dysfunctional data center. But it will help managers ask the right questions when they evaluate their current data resources.

The book is organized in three main sections. The first is a chapter describing what Brackett sees as the state of the enterprise data resource. His contention, which I accept, is that most enterprise data isn't well organized, structured or validated. It's not made widely available to those who need it, in the form that they need it. Not only that, but data quality degrades over time. Considering that data resources are expensive, and essential to the business or other organization that created them, data managers face real challenges.

The second section of the book comprises 10 chapters, one dedicated to each of Brackett's 10 bad habits. More about those shortly.

The third section of the book provides advice as to what can be done to overcome those bad habits—not the technical fixes, but the broader organizational, cul-

tural and financial steps that must be taken. He stresses, over and over again, that there's no silver bullet. Creating and maintaining data resources is hard work, and must be pursued relentlessly.

### BAD HABITS, BEST PRACTICES

The meat of "Data Resource Quality" lies in chapters 2 through 11, where Brackett describes each of his 10 bad habits. Each chapter describes a list of unacceptable or unreasonable items. It discusses the business impact of those habits. It then suggests corresponding good habits to replace the bad habits, and the business impact of those good habits. It concludes with a collection of best practices for turning those bad habits into good ones.

The problem is that the prose in those five parts of each chapter is repetitive, formulaic and downright tiresome to read.

Each of the chapters contains dozens of items, each of which describes a different attribute of the bad habit. Unfortunately, those items overlap, refer both forward and backward to other material in the book (without page numbers), and most annoying of all, have one-sentence summaries stuck in the middle of each item, surrounded by a thick-bordered box. This swiftly became tiresome and distracting. The author really seems to think in PowerPoint bullets, from which I'd wager this book was written.

Patient digging, however, reveals pure

gold. The first five bad habits that Brackett describes involve the structure of the data resources themselves, and cover formal data names, formal data definitions, proper data structure, precise data integrity rules and robust data documentation. Those are the relatively easy habits to spot and overcome.

The next five are the hard ones, because they're often deeply entrenched throughout a data center: having a reasonable data orientation, providing acceptable levels of data availability, assigning adequate responsibility for the data, having an expanded data vision that fits the business, and ensuring that the value of the data is recognized appropriately.

Like I said, pure gold. Many organizations claim that their data is a strategic asset. It's time to treat it as such. If your responsibility encompasses the creation or maintenance of such data resources, or if your teams are building new systems that will interface with enterprise data, this book will help you evaluate the strengths and weaknesses of those data resources. It's hard to read,

but it's worth the effort. ■

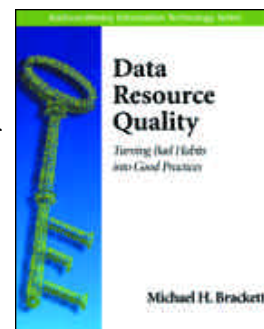
*"Data Resource Quality: Turning Bad Habits into Good Practices." Michael H. Brackett. Addison-Wesley, 2000. Trade paper, 354 pages, \$39.95.*

*Alan Zeichick is editor-in-chief of SD Times.*

### BOOK WATCH



ALAN ZEICHICK





## INFORMIX

◀ continued from page 1

tial revenue and profitability growth throughout 2001.”

The two parts of Informix, the database company and e-business services company, will be completely separate legal and financial entities by the end of 2000, said Brian Staff, vice president of marketing for

Informix Software, the database half of Informix.

### GETTING THE POINT

Informix Software has also started discussing “Project Arrowhead,” designed to be an all-encompassing family of database products growing out of its existing Extended Parallel Server (XPS), but with features taken from the company’s other core

databases, namely Foundation.2000, Informix Dynamic Server and Red Brick Decision Server, with a goal to manage complex sets of data across multiple transactional environments.

The Arrowhead product family will include not only the enhanced XPS, which Staff referred to as the Arrowhead Database Server, but also an application server, a Web server

and a set of development tools. But that doesn’t mean that any of the other databases will be going away soon, he said. “Yes, we own a lot of databases—11 of them,” he laughed, “but seven are ‘classic’ products. They make us a lot of money and have loyal customers, but we do little with them.” Foundation.2000, Informix Dynamic Server and Red Brick will also continue to be offered, Staff said, as long as customers still want them. “[Arrowhead] will be a replacement database for some customers. For others it will be irrelevant,” he said, adding that the primary goal for Informix Software is to attract new customers, to help the former No.1 database company recapture market share lost to Oracle Corp., IBM Corp. and Microsoft Corp.

The migration to the Arrowhead vision will be stretched out over the next couple of years, said Staff. The first tangible component, the Arrowhead Application Server, will be unveiled in the first quarter of 2001, he said, adding that the product will either be an existing app server acquired or licensed by Informix, or a

rebranded product from a business partner. The second quarter will see the release of enhanced online transaction processing features for the XPS database server. The final move to the Arrowhead product family will occur in 2002, he said, with the addition of a Web server and development tools.

Also at the Informix conference, the company announced version 8.31 of Extended Parallel Server for Linux, distributing a developers’ edition at the conference. Previously, XPS had supported only the Unix operating system on a variety of uniprocessor, multiprocessor and massively parallel hardware platforms.

Informix also updated its Red Brick Decision Server to version 6.1. The update, according to the company, adds support for Linux, JDBC 2.0 and ODBC 3.5. It also automatically maintains aggregate tables to speed up query response, and has improved data parallelization algorithms. A new feature is random data sampling for providing rapid data analysis during data mining operations. Red Brick 6.1 is currently available. ■

## HP/BLUESTONE

◀ continued from page 1

and Praesidium, a security software package.

Meanwhile, Bluestone’s Total-e-Business product, offering J2EE and XML application server capabilities, along with Bluestone’s Java Transaction Service, will form the core of HP’s middleware line to enable its customer base to develop, integrate, deploy and manage J2EE and XML applications across the enterprise, the Internet and mobile devices.

“We don’t have middleware operations to date,” said Bill Russell, HP’s vice president and general manager of software and services, “and the technology they

have, in our view, is way ahead.”

Bluestone anticipates benefits from the acquisition to its customer base as well. P. Kevin Kilroy, president and CEO, said the company’s greatest enemy had been the perception among its users that it could not remain viable as a smaller company because of its inability to win high-end clients.

Prior to the HP announcement, Bluestone was moving forward with separate deals. It recently launched Bluestone Developer Zone, an online peer-to-peer support resource created in conjunction with HotDispatch Inc.

In addition, Bluestone had reached a joint marketing agreement with Percussion Software

Inc. to combine Percussion’s Rhythmyx Content Manager and Bluestone’s Total-e-Business platform to help programmers implement e-business applications with the flexibility to evolve with changing requirements and technologies.

Bluestone had also begun shipping its Total-e-Server Release 7.2, featuring support for the Enterprise JavaBeans 2.0 specification. It also embeds the Bluestone Java Transaction Server, includes the Universal Session Manager and bundles Progressive Software’s SonicMQ Java Message Service for a starting price of \$30,000.

With the purchase, Bluestone will become a wholly owned subsidiary of Hewlett-Packard. ■

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## Shouldn't managers and developers speak the same language to define a project?



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## GETTING THE MESSAGE WITH JMS

The Java Message Service (JMS) is emerging as an important development in the world of message-oriented middleware (MOM) products. Today's MOM market is dominated by IBM's MQSeries; although numerous smaller players, such as Tibco and Talarian, occupy important niches in which MQSeries is not the tool of choice. These companies provide a means by which applications on different platforms can share data in a reliable manner. The key concepts are that the messaging works across different applications and platforms (while maintaining a single API) and that it is reliable. And today, as distributed enterprise computing infrastructure becomes the norm, MOM software is enjoying a renaissance of sorts—a long overdue renaissance, in my view, since its delay is attributable to the common misperception that middleware was a dinosaur product associated with mainframes.

Today, those who suffered under this misperception have been disabused by the recognition that apps must pass data along asynchronously. That is, they must be able to send data to other applications, trust that the data got there, and

not be obliged to wait for a confirming reply. JavaSoft, the promulgator of Java technology, recognized enterprises were indeed becoming aware of their need for asynchronous messaging; and so it developed JMS. As it stands today, JMS is an API. It specifies the syntax of function calls to a service that will deliver messages across the enterprise. (The current version of JMS is 1.02, and the specification can be downloaded from [www.javasoft.com/jms/](http://www.javasoft.com/jms/).)

Currently, JMS supports two styles of destination definition: point-to-point and publish-and-subscribe (commonly called pub/sub). In point-to-point, a message is sent to a specific application on a specific platform. In pub/sub, a message is sent to a server that keeps a list of all clients interested in this particular data (the subscribers). That server then sends copies of the message to the subscribers. The pub/sub model is often used in the delivery of real-time data. For example, all stock-brokers on a trading floor would subscribe to price quotes, but would not subscribe to quotes on pork-belly

futures. JMS does not define more than the API. For example, it does not specify how the pub/sub delivery mechanism should work. In fact, it does not even define what the messaging transport should be. All it defines is the grammar by which Java apps should interact with the enterprise messaging middleware.

But even this limited mission statement will come as a huge relief to many IT shops. Middleware vendors all use different and proprietary APIs for their

messaging service. This means that migration from one service to another is effectively impossible, since it would require every application that interfaces with the middleware to be rewritten. By standardizing on a single API, apps can now be ported with ease, and middleware vendors will no longer

enjoy proprietary-code lock-in. Rather, they will have to compete on quality of implementation and, of course, on cost. This is all to the good. And predictably, middleware vendors are quickly moving to support JMS. Soon, I expect, JMS compatibility will be a checklist item for all middleware purchases. The bigger benefit, though, comes in hiring developers—no longer will candidates have to know Tibco's specific interfaces or

IBM's; rather they will just need to know JMS.

Unfortunately, the API set is rather limited and it will probably undergo some revisions. For example, JMS specifies only the APIs necessary for delivery and receipt of messages. Key functions such as error notification, security and encryption, and administration have been neglected. In "Javanese" terms, these have been left as implementation details to the JMS providers—the vendors who provide the technology that implements the JMS API. This limitation is likely to be removed in future versions.

Meanwhile, IT managers should begin the process of integrating the JMS interfaces into their code bases. Once your current middleware vendor supports JMS, have your developers use this API rather than the proprietary ones they have learned. This will confer two advantages. You will find it easier to hire developers who can code to your middleware. Plus, porting to other middleware will be easier. Of these two, the first is the most practical and the most compelling. But you never know when the second benefit will be important. ■

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### MIDDLEWARE WATCH



ANDREW BINSTOCK

## WHO SAID IT?

How carefully have you been reading the news? High-tech execs and open-source opinion leaders have been uncharacteristically vocal in recent weeks, using colorful language to describe their goals and deride competitors. See how many of these quotes you can identify.

1. "Do people have any concept of what it means to live on less than a dollar a day? There's no electricity. Do they have PCs that don't use electricity?"

2. "I think we'll be the No. 1 Linux company...by a long shot. I'll challenge our Linux experience against Red Hat's any day."

3. "We did start the open-source revolution."

4. "I'm not always as stern...as I should be, and I end up accepting changes even after the point where I know I shouldn't."

5. "When was the last time you bought left-blinker software for your car?"

6. "You want to steer clear of Sun. Sun just doesn't get it. That's a crazy thing to say."

7. "If we're so far behind, why is Scott spending so much energy attacking [us]?"

8. "It is up to the game developer to use smells wisely...just as they learned to use sound to improve games. Scentography is a new art form."

9. "We didn't recommend any man-

datory practices. We did consider them, but not even the most conservative members of the commission felt that was the road to go down."

10. "There was a project started by the IT industry where somebody set up a Web site, and literally in the announcement, they said, 'This Web site will eliminate poverty.' And I wasn't sure that that was really going to happen."

11. "It was a cheap tactic to bring Palm users into the fold with freebies. And I think they did that because the device doesn't stand well on its own."

12. "This is just another step in the stealth Linuxization of Sun."

13. "I don't think there's any marketing person at Microsoft who would ship a product without the word 'open' on the box."

### THE ANSWERS

1. Criticizing others' understanding of the meaning of poverty was none other than the world's richest man, Bill Gates. The comments came as Gates mocked a Hewlett-Packard Co. initiative to deliver computer technology to the globe's poorest people at GartnerGroup's ITXpo conference.

2. That was Sun Microsystems Inc. chairman and Solaris champion Scott McNealy claiming the high ground in the Linux market after Sun's acquisition of Cobalt Networks for \$2 billion.

3. Red Hat Inc. chief technology

officer Michael Tiemann clumsily claimed credit for sparking the open-source revolution at a WR Hambrecht conference. Later, Tiemann explained that he meant Red Hat subsidiary Cygnus, which was founded in 1987 and which Red Hat acquired in January 2000.

4. Linux creator Linus Torvalds uttered this *mea culpa* as explanation for delays in the release of version 2.4 of the Linux kernel. "I allowed too much new code too late," he admits.

5. Sun's McNealy uses the "left blinker" analogy to support his contention that "software is a feature, not an industry."

6. In response to McNealy's characterization of software as a feature, Microsoft president Steve Ballmer advised ITXpo attendees to steer clear of Sun. "It's software that lets you build scalable Web sites," Ballmer said. "When people benefit from PowerPoint or e-mail, it's software that enables it. EMC—a hardware company—boasts that 75 percent of its engineering is in software."

7. Hewlett-Packard CEO Carly Fiorina responded to an HP-directed barb in McNealy's ITXpo keynote with this rhetorical question.

8. DigiScents Inc. co-founder and CEO Joel Bellenson offered this sage advice as he described his company's technology, including its ScentWare Web Development Kit, in a "Good Morning, Silicon Valley" interview.

9. This explanation comes from

Donald Telage, chairman of a congressional commission charged with making a recommendation regarding the use of Web filters for publicly funded schools and libraries. The commission surprised Congress by failing to recommend mandatory use of Web filters.

10. Poverty expert Bill Gates explains how IT companies can best aid the Third World. "Yes, there are fantastic things that IT companies can and should be doing," Gates said in response to an ITXpo question. "I think they do have to be tempered with a little bit of reality."

11. That was Rick Broida, author of "How to Do Everything with your Palm Handheld," commenting on a Microsoft event that brought leaders of the Palm Computing community to Redmond for presentations on Microsoft's Pocket PC platform—and gifts worth more than \$1,400 per person, including handhelds from Compaq and HP.

12. That's Open Source Initiative president Eric Raymond, commenting on Sun's purchase of Cobalt Networks Inc. for \$2 billion.

13. Bill Gates again, commenting on the amazing marketing power of the word "open."

How did you do? ■

*J.D. Hildebrand is the former editor of such publications as Computer Language, Unix Review and Windows Tech Journal. Reach him at [atjdh@sdtimes.com](mailto:atjdh@sdtimes.com).*

### OPEN SOURCE



J.D. HILDEBRAND



## A LONG, HARD RIDE

You've got to hand it to the baby boomers. They've taken a long-term view of the stock market and stuck with it, despite this year's roller-coaster ride. It's understandable. With banks paying less than 3 percent on savings accounts, bond yields not much higher, and the knowledge that money stuck in a coffee can pays no return at all, they've taken their life savings and retirement money and forged headlong into the market—for better or for worse.

It was no surprise, then, to read recently that investor optimism has remained steady even after the precipitous drop in the markets on Oct. 12. Long-term investors realize that the stock market is their best choice for larger rates of return, and they've decided they'll ride out the ups and downs for a chance to earn more on their money.

This is not some display of blind faith, as there are plenty of places to find reason for optimism in today's market. One sector that stands out is software. Company after company exceeded analysts' expectations: A full 57 percent reported that quarterly earnings in October showed a "positive surprise," according to Tracy Eichler, an analyst at Paine Webber who helps track investor optimism. Eichler said small market declines are short-lived in people's minds, and the next time positive news hits the market, the declines are forgotten. In fact, she indicated that the largest drop in optimism in Paine Webber's October report was in investors with 15 or more years in the market, who have experienced long periods of "dead money," when rebounds took months to occur. The newer investors, Eichler said, see that

it can be only a matter of days for markets to correct themselves.

It is widely understood that two key factors drive the stock market: interest rates and earnings. And with the Federal Reserve holding fast on rates after a series of increases effectively slowed down a runaway economy, all eyes turned to earnings. Interestingly, while beating the estimates has helped companies' stock prices only marginally in most cases, failing to meet them, even by a few cents per share, has been near catastrophic to share prices.

Major corporations still hold tremendous sway. Analysts cite the solid earnings report from Microsoft Corp. in mid-month—profits up 30 percent from a year ago; operating earnings of 38 cents per share (4 cents higher than consensus estimates); net income of \$2.19 billion, up from \$1.68 billion a year ago—as helping to fuel the turnaround. But there are other recent examples as well:

Inprise Corp. reported third-quarter revenues of \$47.6 million, up from \$45.7 million a year ago, and earnings of 12 cents per share compared with a loss of 3 cents per share a year ago. Among the highlights cited in its announcement were the release of the AppCenter 4 management platform for Web-based applications, release of JBuilder 4 and some management shifts. Curiously, there was no mention of progress on its Kylix tool suite for Linux, which was reported to have gone into beta in June and has been in the works since August 1999. Also, Inprise was to spin off Interbase as a separate company providing database software to the open-source community. This deal reportedly hit legal snags

back in August when the company said it was near finalization.

Iona Technologies Inc. reported record third-quarter revenues of \$39.9 million, a 51 percent increase over 1999, and earnings of 24 cents per share, which beat the Street by 2 cents. The quarter marked the first in which all parts of the iPortal suite, which helps companies develop their own Web portals, were available.

Rational Software Corp. reported second-fiscal-quarter pro forma earnings of \$187.5 million, up from \$128.2 million a year ago, with pro forma earnings per share of 17 cents as compared with 10 cents a year earlier. Rational's executives believe the company will grow exponentially with the increased reliance of businesses on software.

Sybase Inc. posted third-quarter earnings of 30 cents per share, beating Wall Street estimates by a nickel. Revenues were up 11 percent from the year prior, to \$239.1 million from \$216.1 million. Analysts believe that for this momentum to continue, Sybase must show growth in the mobile application hosting market through its iAnywhere subsidiary, an expansion of its portal technology division, and a clear vision for its database and application server businesses.

There are, however, reasons for caution. According to First Call Corp., a company that tracks corporate earnings reports, 146 companies already have reported negative preannouncements of fourth-quarter earnings. And the technology sector has seen an 11-point slash in fourth-quarter earnings growth estimates. But even First Call admits it is difficult to predict what will happen in the tech sector over the next few months, as the reasons for drop in earnings growth remain unclear.

And so, the baby boomers "let it ride." ■

David Rubinstein is executive editor of SD Times.

### MONEY WATCH



DAVID RUBINSTEIN

## ON THE INSIDE

In its October issue, Forbes magazine listed **Serena Software Inc.** sixth on its list of the 200 Best Small Companies in America. Its executives already had the cash to prove it. President Mark Woodward sold 50,000 shares at an average of \$42 per share on Sept. 21. Also on that date, VPs Anthony G. Stayner and Vita Strimaitis sold 30,000 shares at \$43 per share, VP Igor Yasno sold 15,000 shares at \$43, and CFO Robert Pender sold 34,000 shares at an average of \$42 per share.

At **SilverStream Software Inc.**, VP Diane Gordon bought 4,000 option-related shares at \$4 per share and sold 4,000 shares at \$32.50 per share in a transaction recorded in mid-October. Meanwhile, **BEA Systems Inc.** president Sam Cece bought 12,000 option-related shares at \$5.69 per share and sold them at \$69.83 in a deal recorded in late October.



### CALENDAR OF EVENTS

#### Testing & QA Techniques Seminars

Nov. 20-21

Toronto Colony Hotel, Toronto

\$995 including courseware. Group discounts. Visit Web site for additional dates and cities.

[www.newinstruction.com](http://www.newinstruction.com)

#### WebTek

Nov. 27-29

The Toronto Board of Trade, Toronto

Seminar, conference and tutorials, \$1,395; conference and tutorials, \$1,295; conference only, \$895; tutorials only, \$595.

[www.interdoc.ca/conference](http://www.interdoc.ca/conference)

/webtekOTT2000

#### Future of Application Development Summit

Nov. 27-30

Renaissance Waverly, Atlanta

Four-day conference, \$1,795.

[www.dci.com/brochure/fadat1](http://www.dci.com/brochure/fadat1)

#### Wireless DevCon 2000

Dec. 3-5

Doubletree Hotel, San Jose, CA

Two-day conference, \$1,295; any one day \$675; night classes available.

[www.wirelessdevcon2000.com](http://www.wirelessdevcon2000.com)

#### Future of Application Development Summit

Dec. 4-7

Marriott Hotel & Marina, San Diego

Four-day conference, \$1,795.

[www.dci.com/brochure/fadsd](http://www.dci.com/brochure/fadsd)

#### LinuxWorld

Jan. 30-Feb. 2, 2001

Jacob K. Javits Convention Center, New York

Full four-day conference passes, \$875; one day, \$225; half-day tutorials, \$275.

[www.linuxworldexpo.com](http://www.linuxworldexpo.com)

#### Embedded Executive Summit

Feb. 4-7, 2001

La Costa Resort, Carlsbad, CA

Summit registration only, \$2,195; all-inclusive packages available.

[www.embedded.com/exec](http://www.embedded.com/exec)

#### Windows Embedded Developers Conference

Feb. 6-8, 2001

Mandalay Bay Resort and Casino, Las Vegas

Pricing has not been announced.

[www.WindowsEmbeddedDevCon.com](http://www.WindowsEmbeddedDevCon.com)

#### Internet Appliance Workshop

Feb. 20-21, 2001

San Jose Wyndham Hotel, San Jose, CA

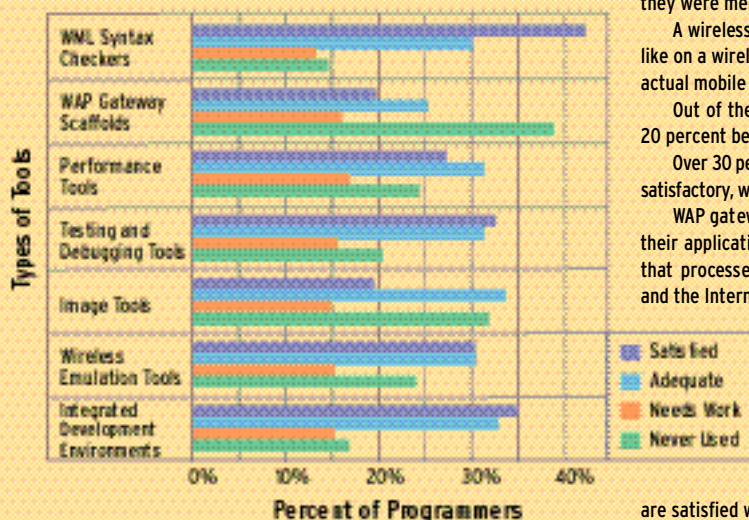
Two-day conference including all events, \$995; tutorials only, \$595; workshops only, \$495; single tutorial, \$345; early bird discounts before Feb. 2.

[www.netapplianceconf.com](http://www.netapplianceconf.com)

Send news about upcoming events to [events@bzmedia.com](mailto:events@bzmedia.com).

## Are Developers Satisfied With Wireless Development Tools?

### Satisfaction Level With Tools



An integrated development environment is a set of tools usually available with a single, unified user interface. As many as 35 percent of wireless-application developers are satisfied with the tools available, while almost 50 percent said they were merely adequate or needed improvement.

A wireless emulator allows a developer to see what an application might look like on a wireless device without having to load the application and test it on an actual mobile device. One-third of developers consider them to be satisfactory.

Out of the 68 percent of developers who use image tools for wireless, only 20 percent believe they are adequate.

Over 30 percent of wireless developers felt that testing and debugging tools are satisfactory, while almost half thought they were adequate or needed improvement.

WAP gateway scaffolds are emulator gateways that allow developers to test their applications to see how they might function via a WAP gateway (software that processes communications between the microbrowser on mobile devices and the Internet). Only 20 percent believe WAP gateway scaffolds are satisfactory, but almost 40 percent claimed never to have used them.

Syntax checkers verify the commands in a computer program and allow the developer to see the errors in syntax without actually having to run the application. While 42 percent are currently satisfied with such tools, about the same number said they were merely adequate or needed work.

Results indicate that less than half of wireless developers are satisfied with the available tools.

### EVANS DATA WATCH

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A hierarchical organizational chart is depicted against a textured blue background. At the top, a single hand points downwards. This hand is connected by a horizontal line to two more hands, representing a second level of the hierarchy. These two hands are further connected by horizontal lines to a total of five hands in the third level. The structure continues to branch out, with the leftmost branch having three more hands at the fourth level, and the rightmost branch having one hand at the fourth level. The hands are stylized, with fingers pointing in various directions, and are connected by thin black lines that form the organizational structure. The overall effect is a visual metaphor for a team or organizational structure.



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